

# ICTskills4All

Liliana da Silva Rodrigues

Mestrado em Design de Comunicação

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ICT  
skills  
4All



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Supervisor: Ana Bastos Raposo

Co-Supervisor: Bruno Giesteira

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## ABSTRACT

Europe is facing demographic changes with the rapid and growing aging of its population. This aging is visible in the evolution of the population's age structure and is reflected in the increase of elderly people and in the reduction of people of working-age in the total population.

The elderly face an increasingly technological society, accelerated by COVID-19 pandemic, making them feel naturally excluded, mainly due to the difficulty in handling and using technology, the difficulty of accessing this technology and the feeling of incapacity to learn new things. The lack of digital skills in the elderly population is often synonymous with social isolation, segregation in access to information and services, loss of autonomy and an increase in the feeling of inability to adapt to society.

Improving older adults' digital skills is a way to improve their quality of life by providing an active lifestyle and freedom of choice and decision.

The aim of this project, was the survey of teaching material and learning website specific for the elderly population at national and European level and from there the development of a learning website and teaching materials using an User-centred design approach, usability testing and the inclusion of end-users throughout the product development cycle, providing therefor information on how real users interact with the system.

As a result, it was possible to create a learning platform for older adults, as well as teaching materials that allow them to acquire digital skills and knowledge in a free and inclusive way.

**Keywords:** user interface, guidelines, good practice



## RESUMO

A Europa enfrenta mudanças demográficas com o rápido e crescente envelhecimento da sua população. Este envelhecimento é visível na evolução da estrutura etária da população e reflete-se no aumento de idosos e na diminuição de pessoas em idade ativa na população total.

Os idosos enfrentam uma sociedade cada vez mais tecnológica, acelerada pela pandemia do COVID-19, fazendo com que se sintam naturalmente excluídos, principalmente pela dificuldade em manusear e usar a tecnologia, pela dificuldade de acesso a essa tecnologia e pela sensação de incapacidade de aprender novas coisas. A falta de competências digitais na população idosa é muitas vezes sinónimo de isolamento social, segregação no acesso à informação e serviços, perda de autonomia e aumento do sentimento de incapacidade de adaptação à sociedade.

Melhorar as competências digitais dos idosos é uma forma de melhorar a sua qualidade de vida, proporcionando um estilo de vida ativo e liberdade de escolha e decisão.

O objetivo deste projeto foi o levantamento de material didático e websites de aprendizagem específicos para a população idosa a nível nacional e europeu e a partir daí o desenvolvimento de um site de aprendizagem e de materiais didáticos utilizando uma abordagem de design centrado no utilizador, testes de usabilidade e inclusão dos utilizadores finais ao longo do ciclo de desenvolvimento do produto, fornecendo assim informações sobre como os utilizadores reais interagem com o sistema.

Dessa forma, foi possível conceber uma plataforma de aprendizagem para idosos, bem como materiais didáticos que lhes permitem adquirir competências e conhecimentos digitais de forma gratuita e inclusiva.

**Palavras-chave:** user interface, guidelines, boas práticas



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# INTRODUCTION

## 1.1. Context

One of the greatest achievements in the last century was the increase in average life expectancy, mainly due to advances in public health, technology, and medicine. Indeed, in 2015, there were 901 million people with 60 years or older, most of them living in developing countries. This number is expected to more than double by 2050, reaching 2.1 billion (20% of total population).

According to Eurostat, in 2014 the prevalence of individuals with 55 to 74 years old that never used the computer is of 41% in European Union (28 countries), ranging from 8% in Denmark to 70% in Greece. Moreover, senior population is facing an increasingly technological society, which makes them feel naturally excluded. This is due to the difficulty to handle and use the technology, the difficulty in access to this technology, the feeling of incapacity in learning new things, among other factors. Indeed, ICT uptake by older adults actually depends on the intersection of multiple factors related with both technology features (e.g. ease of use) and several users' characteristics (e.g. age, gender, physical, mental and cognitive skills, expectations, biographical experience). The absence of digital skills in the senior population is often synonymous of social isolation, segregation in access to information and services, loss of autonomy and increased sense of inability to adapt to the society. Indeed, improving digital skills in old adults is one way of improving their quality of life through an active lifestyle and freedom of choice and decisions.

ICTskills4All is an international project, funded by the European Union under the Erasmus + KA2 program, coordinated by the University of Porto and developed under the scope of the Competence Centre for Active and Healthy Aging at the University of Porto – Porto4Ageing that develops projects in the active and healthy aging area. It is in this R&D context, under this scope, that my

internship was developed, and driven my main research question and respective contribute:

- What kind of design approaches and user interface (UI) guidelines should be taken in account when designing an interaction experience with display devices for seniors with low digital literacy contributing for policy improvements at international level?

The ICTskills4All Project aimed to develop digital skills through an online platform with educational content, developed specifically for the population over 55 whose skills in this field are reduced. ICTskills4All represents a contribution to improve the quality of life and autonomy of senior citizens, aiming at a positive impact on the adult and senior education sector in digital environments and following the current trends in the educational sector and the information society.

The proposed learning program included: 1) a dedicated website with information, training tools and resources for old adults; and 2) provided access to face-to-face help and support, through an intergenerational and peer-to-peer approach. The draw up of recommendations for transferability of ICTskills4All results were also a goal of the project.

## 2. METHODOLOGY

The methodology took in consideration the connection of multiple factors related with both technology (access, availability, and level of difficulty of use) and users (several dimensions: age, gender, physical, mental, and cognitive skills, expectations, lifestyle, socioeconomic backgrounds). Consequently, ICTSkills4All contributed to foster inclusion, active citizenship, and participation (which is increasingly connected with digital literacy) among seniors.

- The study of prior actions and good practices in terms of educational programming for senior citizens at national and international level.
- The training modules were designed including key competences relevant for the entire European area, as its contents were tested and validated within the lifetime of the project.
- The comparability of results; the sharing of research findings and results to other organizations/countries active in the sector.
- The content was developed taking into attention accessibility for older adults, with the purpose of guaranteeing a greater autonomy to use website content, such as vision, hearing, motor control and cognition.
- Perform usability tests of the web platform and online tools with end-users.

- Framed by a user-centred design approach, the ICTskills4All sets usability tests as an irreplaceable practice to provide input on how real users interact with the system. The inclusion of end-users throughout the R&D process is embedded in a participatory design approach tending to favor the future uptake of the solution;
  
- Several iterations were established as a minimum standard for the user tests, which are planned to be implemented in realistic but controlled environments, addressing first the core functionalities of the platform and lastly the complete solution. The first group of user tests will comprise high-level goals including the assessment of the platform's 'look and feel' appeal; of the extent to which the platform organization makes it easy to find the information, keep track and predict where information is contained; on how well the platform prevents errors or helps the user to recover from errors; and how pleasant, satisfying, and interesting is the user interaction with the platform. The goals for the following loops will rely on the findings from the first loop and implementation of system's improvements. The usability protocol is designed to capture the participant's navigational choices, task completion rates and ratings, overall satisfaction rates and ratings, and resource to the techniques of task analysis with think aloud protocol, video analysis and questionnaires. Therefore, objective (e.g., task completion rates) and subjective (e.g., satisfaction) measures are collected. Consenting participants will be recruited by convenience according to pre-defined profiles corresponding to the target groups and, within those profiles, the recruitment of heterogeneous participants regarding demographics and ICT skills will be considered (e.g., to avoid overrepresentation of the so called 'lead users'). A screening tool tackling demographics and, most importantly, psychographics will be used to screen for eligibility in the recruitment

stage. Since it is well accepted that about 15 users can detect 90 to 100%, with larger numbers resulting in redundant or saturation of findings and considering that the performance of smaller user tests in several iterations is the recommended practice.



### 3. WORK PACKAGES

#### 3.1 Research online resources for older adults in Europe

As one of the objectives of the ICTskills4All project was to develop online content to improve digital skills in older adults, we found necessary to perform a review of existing online resources dedicated to improving the digital skills of adults aged 55+ at regional, national, European, and international level and their efficacy. This revision was performed by all partners who provided data crossing different databases at national, European and international levels. The public content of such resources has been analyzed as well as several Graphic Design aspects, focusing Senior Centered Design and assessing if the identified resources meet the needs of the older adult user. This information was later used to develop the website information/educational materials.

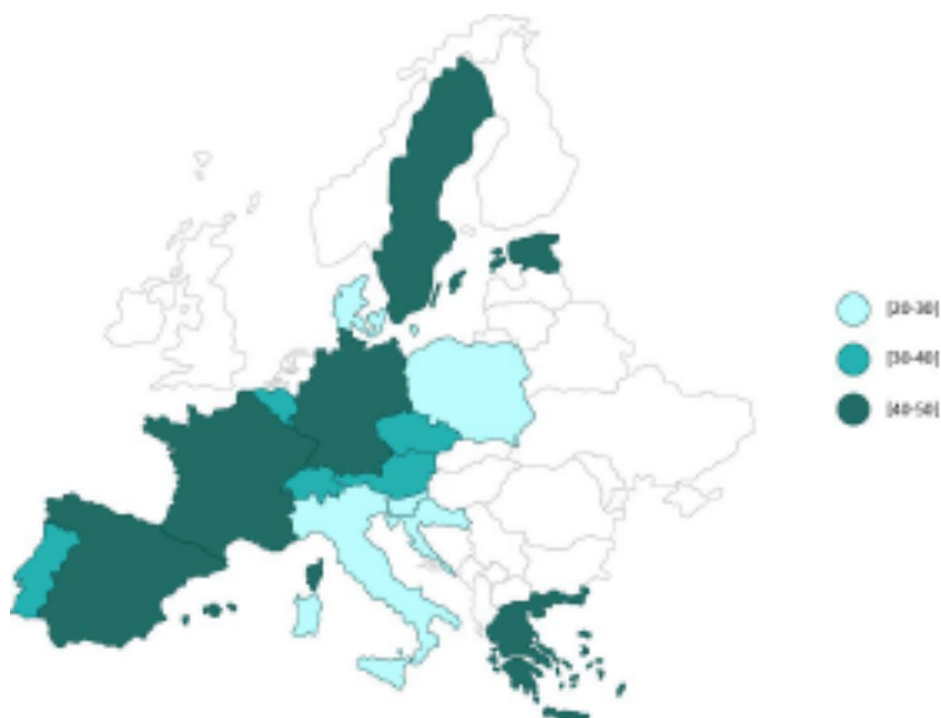


Figure 1 - Prevalence of basic computer skills by country

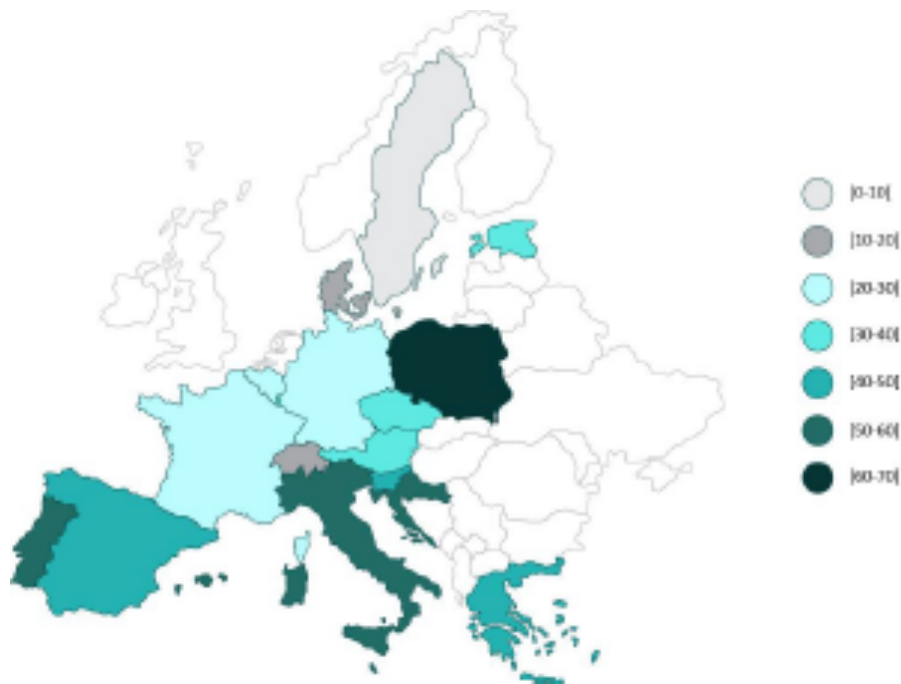


Figure 2 - Prevalence of no computer skills by country

### 3.1.1 Overview of Graphic and Interface Design

Besides analyzing course content and effectiveness, we observed key design aspects in order to proceed with the development of the activities for this project. For this brief analysis, we identified three design aspects to focus on, which are related to typography and website structure: text font family and size, and website navigation. We regard these as basic starting positions to be amplified in a later analysis – for instance, typography will be studied not only in text, but also in titles, subtitles, page composition and information structure. It will also be studied according to the target public, identifying good typography practices for digital media development towards older adults. Typography stands as one of the basic composition principles for graphic design (Baseman, 2005, p. 19). Our option to analyze text font sizes at this point relates to the fact that text represents a

reference for page composition and readability, defining hierarchy and rhythm with the use of visual language connected with time and motion (inherent to the usage of a device's screen) (Worthington, 2005, p. 185–186). Given our target public – older adults – these are aspects that must be taken into consideration prior to developing digital content, since it must be developed according to the cognitive, visual, and motor conditions common among this population segment.

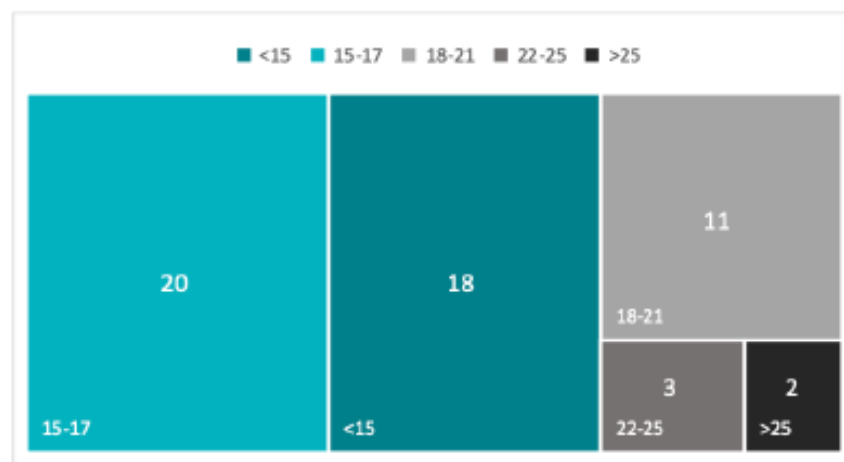


Figure 3 - Number of websites according to font size used in text

Although we found a common use of sans serif fonts, the offered sizes are heterogeneous. The smaller size we identified was 10,5 pixels (px) and the biggest was 28px. Sixteen pixels appear as the standard size for desktop browsers, close to the minimum text size recommended of 12 points (Fonseca et al, 2014). User interface guidelines also point 16px as the minimum size for heavy text pages as well as suggest 18px to be a comfortable size for the average user (Kennedy, 2018). Even though we acknowledge that each font's characteristics may define variations for the appropriate size to use and, therefore, to these guidelines, we verified that approximately one third of the e-learning websites we analyzed feature text fonts with sizes below 15px and approximately two third has font sizes below 18px.

Regarding navigation, current User Centered Design guidelines raise the awareness for the complexity inherent to complex navigation systems and hierarchies, which may contribute to one feeling lost or confused while in a website (Lin, 2017). Web design guidelines for older adults are even more assertive towards this aspect, pointing to clear and simple navigation systems with a minimum of connections possible in order not to overload short term memory (Fonseca et al., 2014). These guidelines include avoiding menus that oblige to move the mouse and, therefore, use fine motricity skills. Examples of this are drop-downs, rollover (Fonseca et al., 2014) or pull-down menus (Kurniawan & Panayiotis, 2005). Focusing online training for older adults, these notions led us to analyze the navigation hierarchy and levels of each website. Taking into consideration different types of navigation (Kalbach, 2007) we considered the following levels of navigation for the websites we analyzed:

- 1 level: homepage or landing page of the website.
- 2 levels: website featuring a main or global navigation (common as the reference for navigation systems).
- 3 levels: website with a global navigation, which features subsequent local navigations associated to the main one.
- 4 or more levels: global navigation with more than 1 level of local navigations.

### 3.1.2 Methodology

Each partner has performed a regional and national search of online resources dedicated to improving digital skills in older adults. This search has been developed using online data of training providers, coupled with meetings with existing educational organisations and trainers in order to understand what resources they use and value. The data gathered was processed by

partners to build a concise observation of several aspects such as type of access (free/paid), type of information and media prevalence for online training (video/text/interactive), user interface (navigation) and graphic design (typography).

### 3.1.3 Conclusion

This analysis covered websites from all the partners' countries, at European and international levels, and has allowed us to identify the necessary features to incorporate into ICTskills4All. Graphic and interface design appear as a core issue to successfully deliver content and training, being areas, which often dictate the success, sustainability, and longevity of online resources. Concerning the analysis in the field of Design, this revision evolved into a more detailed observation of User Centered Design for older adults, focusing on further aspects. This brief revision suggested that there is a need to implement proper graphic and UX/UI design guidelines into web development for older adults, which we would expect to be a concern for websites directed for this audience and for those with worldwide projection. In developing the ICTskills4All platform, there was a commitment to plan content development focusing design and information itself, taking into consideration new services that become available, suggesting topics that are coherent with nowadays technological context. These conclusions underline the importance of projects that promote the dissemination and application of policies for online resources for such audience, taking Graphic, Web and User Centred Design as core areas for accessibility and digital inclusion.

## 3.2 Development of materials for online platform and usability tests

As everything points out, more and more consumers and users of technology are in the category of “older adults”. This demographic change forces important changes in the needs for products and services. Meeting these needs is not just the role of technology; most importantly, we can say, is the role of those who determine how technology should work. In other words, designers are the key, in many cases, not only to increase market share for a particular product, but also to increase the quality of life for the elderly (Fisk et al, 2009).

In this work package, an integration of the achievements of the intellectual output O1 was performed to create information, training tools and resource materials for the web platform. The content was developed taking into attention accessibility for old adults, with the purpose of guaranteeing a greater autonomy to use website content, such as vision, hearing, motor control and cognition. The platform has general information, as well as simple training tools that can be accessed by the old adults in an autonomous way to improve their digital skills. The training tools focus on essentials about digital device use, including desktop computer, laptop, tablet, or smartphone; basic functions of a keyboard, a mouse, and a computer; essential skills to getting started online; essential skills to stay safe online; how to connect with friends and family using social networks; and how to make video calls.

Framed by a user-centred design approach, the ICTSkills4All sets usability tests as an irreplaceable practice to provide input on how real users interact with the system. The inclusion of end-users throughout the R&D process is embedded on a participatory approach and tends to favor the future uptake of the solution, i.e. as usability tests result in recommendations for system’s optimization, the end point should be a platform adjusted to end-user’s needs and requirements. The general goal of the usability tests for the ICTSkills4All was to identify the extent to which the interface facilitates a user’s ability to complete typical tasks with

efficiency, effectiveness, and satisfaction. Hence, besides the user interface, the tests allowed to evaluate the information flow, and information architecture.

### **3.2.1 Characteristics of older adult users and the underpinnings of Human factors**

“Getting older does not necessarily mean to limit the number of products used. However, it is true that older adults are less likely to use technology compared to younger adults as illustrated in Figure 1. Even for commonly available technologies, the older adults used fewer of them compared to younger and middle-aged adults; moreover, older women used fewer than older man did. Similar patterns were observed for breadth of computer use and Internet use (Fisk et al, 2009).”

### **3.2.2 Human Factors**

When designing for older adults there are several factors that should be taken into consideration. Their cultural references, digital literacy, and the physical and cognitive degeneration – Human factors.

Human factors are the study of the characteristics of user and their interactions with products, environments and equipment when performing tasks and activities. The area of human factors develops the scientific knowledge base on the capacities and degenerations linked to the ageing process of people and uses this scientific knowledge about human behavior in the development of the design and use of a human-machine (or human-environment) system. Human factors have as main goal to make the human-system interaction productive, safe, without errors, comfortable and pleasant. Human factors aim to ensure that human-system and human-environment interaction are safe, efficient and effective (Fisk et al, 2009).

| Term                    | Definition                                                                                                                                             | Examples                                                                         |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Sensation</b>        | The awareness of simple properties of stimuli such as color; activation of sensation cells (e.g., retinal cells)                                       | Seeing the color red; hearing a high-pitched sound)                              |
| <b>Perception</b>       | The awareness of complex characteristics of things in the environment; the interpretation of information that results from sensation.                  | Recognizing a red object as an apple or determining that a sound is an alarm     |
| <b>Cognition</b>        | Processes by which the brain takes sensory information from the ears, eyes, etc. and transforms, reduces, stores, recovers, and uses that information. | Thinking, problem solving, reasoning, decision making.                           |
| <b>Movement control</b> | Carrying out an action based on perception or cognition; requires coordination of muscles for control of motion of some type.                          | Steering a car; double-clicking a mouse button; grabbing an object from a shelf. |

Table 1 – Description of Categories, source Designing for Older Adults, Chapter 2, p.p.15

### 3.2.3 User-Centred Design - UCD

User-Centered Design (UCD) was the driven methodology with a high participatory design demanding. Different and complementary methods were used to pursuing an UCD approach, not only for the study and identification of the needs and expectations of the older adults with low or non-digital literacy but also, and most relevant, for their active engagement in different development stages, stimulating their contribution by using strategies and tools that fosters

the empathy and, consequently, a better qualitative feedback and formative evaluation throughout the project (Giesteira et al, 2021).

The methodology User-Centred Design drives the iterative methods and tools used along the development cycle of the website. The Person, the older adult, was the core of our studies and actions, having had the central role in the plot, both, as a potential user in which the needs and expectations had to be study, as well as a key partner helping us to figure out his goals and frustrations in participatory design events.

### **3.2.3.1 User Research**

#### **Surveys**

Surveys are a very usual method for collecting information. They are a very efficient tool to collect a big amount of data in a very short time, with little cost, and with a wide versatility in the type of information that can be collected (Martin et al, 2012).

A questionnaire completed by 84 volunteers was designed to assess digital skills and the needs of those same skills in the 55+ age group (Annex\_1).

We ask the most important questions and answers for the development of the online platform and respective learning tools.

### B1. Como classifica o seu nível de competências digitais/TIC?

84 respostas

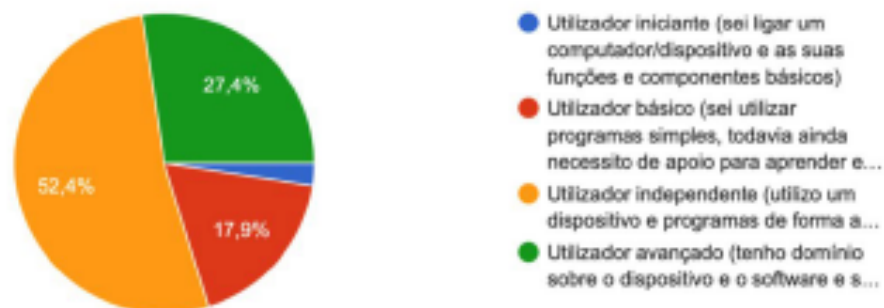


Figure 4 – Results to the questions “How would you rate your ICT skills level?”

### B2. Quais as suas motivações para aprender TIC/informática?

84 respostas

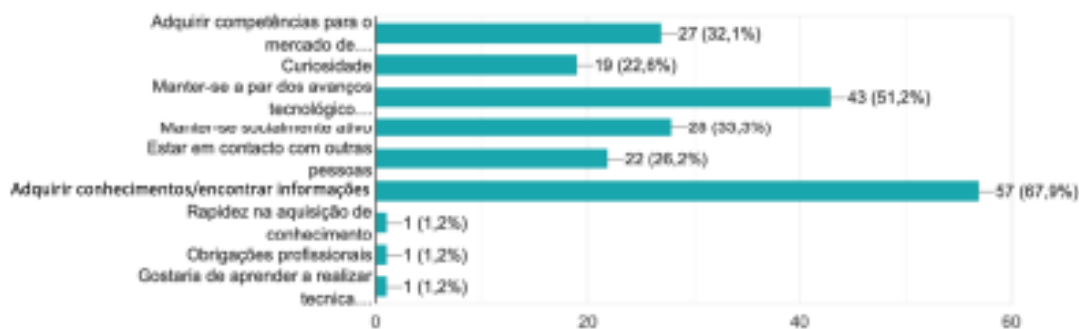


Figure 5 – Results to the question “What are your motivations for learning ICT skills?”

B3. In your opinion, what are the advantages of learning ICT skills for people of your age group? (If you do not find advantages, please say it so using the option 'I do not find advantages')

54 answers

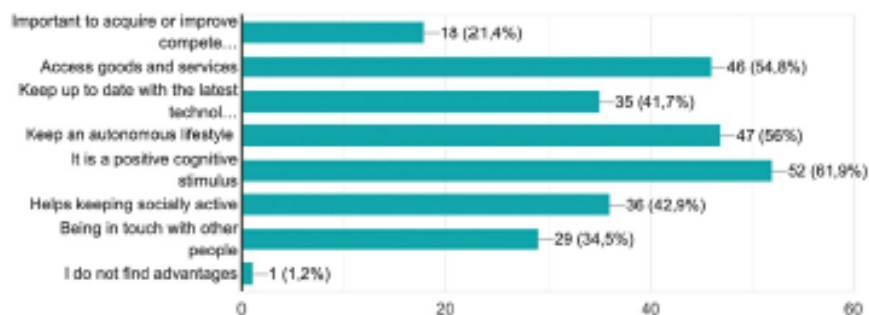


Figure 6 – Results to the question “In your opinion, what are the advantages of learning ICT skills for people of your age group? (If you do not find advantages, please say so using the opinion “I do not find advantages”.

C3. Já utilizou tablet?

84 respostas

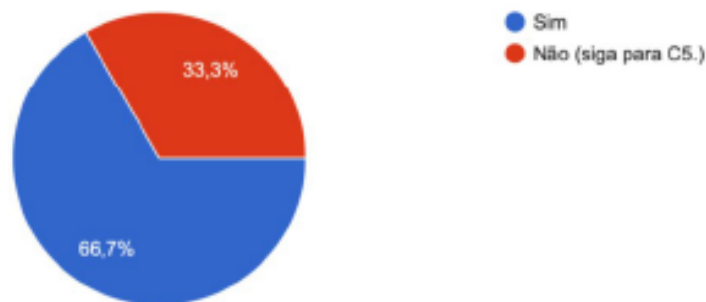


Figure 7 – Results to the question “Have you used a tablet before?”

#### C4. Em caso afirmativo, quais as tarefas que costuma efetuar no tablet?

56 respostas

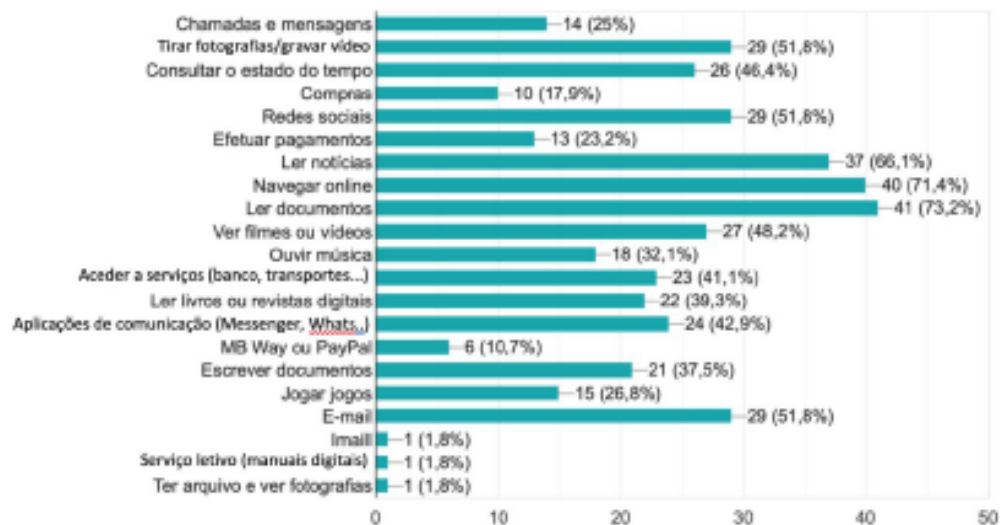


Figure 8 – Results to the question “If you did, which tasks do you usually perform on a tablet?”

#### D1. Costuma navegar na internet?

84 respostas

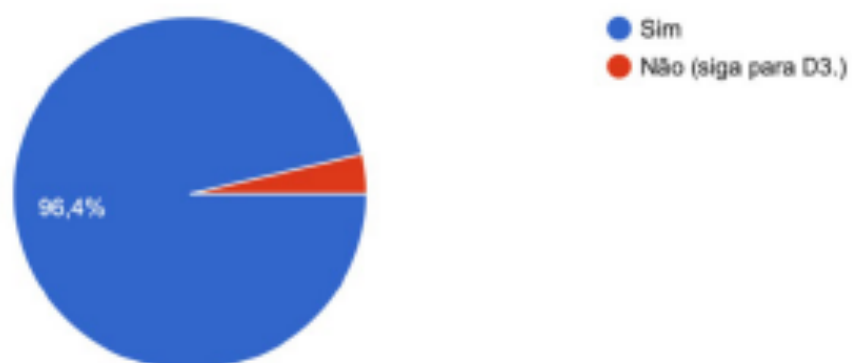


Figure 9 – Results to the question “Do you usually surf online?”.

**D3. Considera que a segurança online é um tema de aprendizagem importante?**

84 respostas

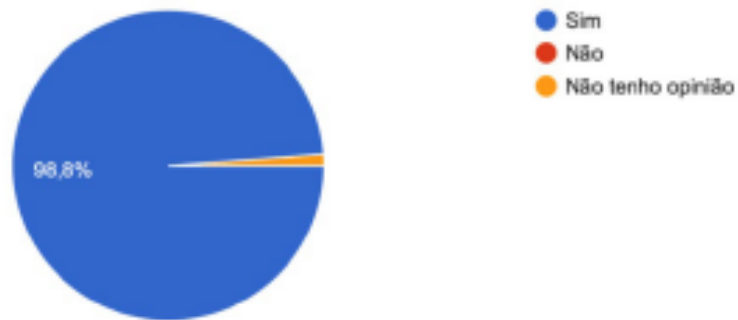


Figure 10 – Results to the question “Do you regard online safety as an important learning topic?”.

**E1. "Saber utilizar dispositivos móveis é uma competência importante para um estilo de vida ativo e para a inclusão social de todas as gerações."**

84 respostas

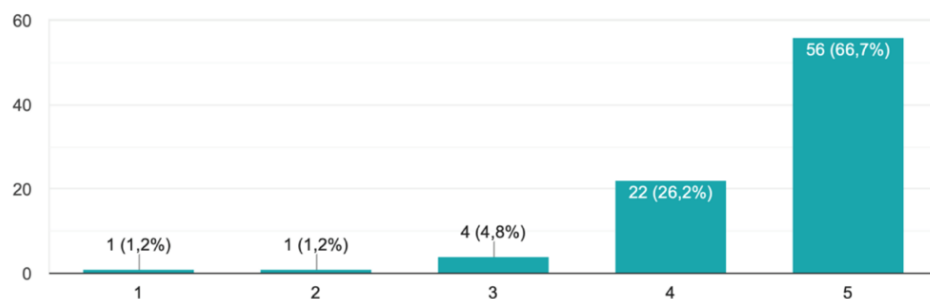


Figure 11 – Results to the question “Knowing how to use mobile devices is an important skill to have a more active lifestyle and to foster social inclusion amongst all generations?”

**E2. "Adquirir competências digitais é importante para assegurar a inclusão profissional de todas as gerações profissionalmente ativas."**

84 respostas

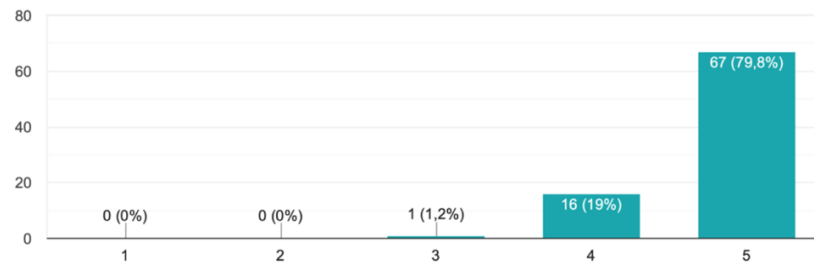


Figure 12 – Results to the question “Acquiring digital skills is important to ensure professional inclusion amongst all generations professionally active?”.

**E3. "Saber navegar online é uma competência importante para um estilo de vida mais ativo e para a inclusão social de todas as gerações."**

84 respostas

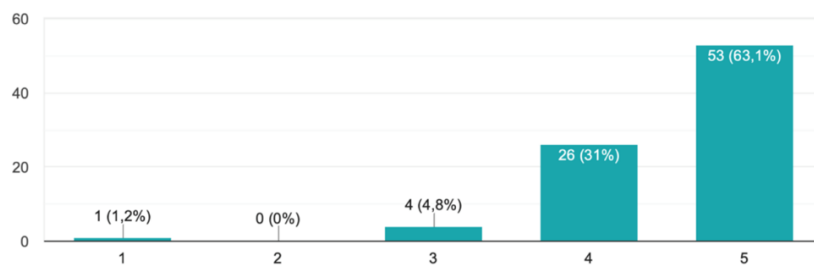


Figure 13 – Results to the question “Knowing how to navigate online is an important skill for a more active lifestyle and to promote social inclusion of all generations?”.

#### E4. "Navegar online contribui para minimizar o isolamento familiar."

84 respostas

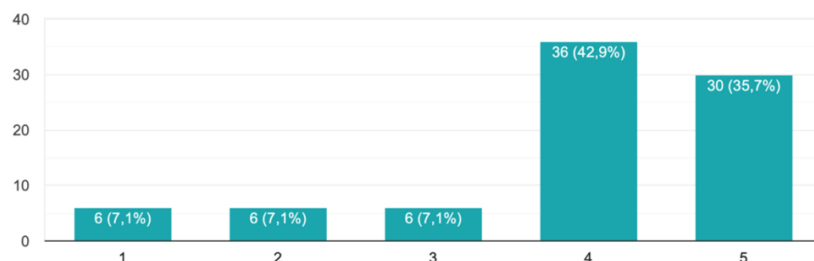


Figure 14 – Results to the question “Using the internet contributes to minimize family isolation?”.

### Field Observation

Participant observation, or PO, is a fundamental anthropological method, adapted for its use in design. For the designer-researcher to know and experience events exactly in the same way the people he is studying, forming empathy and connections. Systematic observation and recording are essential, because documenting not only what is physically evident in the environment, but also the participants' behaviors, interactions, language, motivations, and perceptions. For this purpose, participant observation is usually combined with several other ethnographic methods including interviews. (Martin et al, 2012).

Three classes were attended at two Senior Universities, Porto CCD (Senior University Eugénio de Andrade), in Porto and the Senior University Florbela Espanca, in Matosinhos, with 3 different classes, in order to observe, detect strengths and pain points.

- First class at Porto CCD – Senior University Eugénio de Andrade, had 14 participants, with ages between 67 and 89 years old, all the seniors had prior contact with computers.

#### *Pain points:*

| Structure / Dynamics of training                                                 | Learning contents / Software                                        | Use of Hardware                                                                         |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Repetition of instructions by the trainer.                                       | Need to take notes.                                                 | On laptops, I avoid using the trackpad, mouse preference.                               |
| Paused instructions and repetition of content already given by the trainer.      | Need for autonomous study.                                          | Confusion between click and double click (preference for the second).                   |
| Non-personalized support (class for all, clarification of doubts when requested. | Difficulty memorizing and using keyboard commands.                  | Preference for the mouse over the keyboard - the keyboard appears to be a complex tool. |
|                                                                                  | Difficulty handling hidden menus, submenus, or menus that collapse. |                                                                                         |
|                                                                                  | Loss of course / little ability to recover when lost in the menus;  |                                                                                         |

Table 2 – Pain Points

#### *Strengths:*

| Structure / Dynamics of training                                                                  | Learning contents / Software                                                                          | Use of Hardware |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------|
| Ease of learning in person and with guidance from the trainer.                                    | Easier handling of static content or repetitive behavior / type of constant interaction.              |                 |
| Sense of mutual assistance among seniors (autonomous peer-to-peer approach to assist colleagues). | Easily turn on the computer and sign in. Check email, search google, YouTube and access google drive; |                 |

Table 3 – Strengths

## Conclusion:

There is an effectiveness in learning in person and in the see / do methodology. This learning logic cannot be replicated with video as it is interactive and alternating, whereas a video is continuous and non-interactive, forcing pauses to replicate the content learned.

Interactive class results to mimic the trainer's actions. Interactive whiteboard helps.

Similarity to teaching materials and entertainment for children: slow and repetitive explanations.

- Second class at Porto CCD – Senior University Eugénio de Andrade, had 8 participants, with ages between 65 and 75 years old, some seniors had very basic digital skills.

*Pain points:*

| Structure /<br>Dynamics of<br>training                           | Learning contents / Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Use of Hardware                                                                                                                                            |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Accompany the<br>collective pace /<br>conduct of the<br>trainer. | Identify file types (ppt, doc, etc.)<br><br>Difficulty finding memory and<br>navigating the PPT menus;<br><br>Log out / logout vs. to switch off;<br>identify text selections;<br><br>Identify and interact with overlapping<br>elements; overlay creates overlap<br>creates fear of interacting;<br><br>Use / find my hidden (right button),<br>sub-menus and sections;<br><br>Edit, move or delete (the tendency is to<br>redo (often redo without deleting what<br>creates overlaps and conflicts of<br>interaction);<br><br>Distinguish mouse icons;<br><br>Select text;<br><br>Confusion between click and double<br>click; | Use the keyboard (there seems<br>to be a tactile need that the<br>keyboard overrides because it is<br>complex);<br><br>Identify keys;<br><br>Double-click; |

Table 4 – Pain Points

### Strengths:

| Structure / Dynamics of training                                                                                                                                                                                   | Learning contents / Software | Use of Hardware                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------|
| Peer-to-peer to clarify individual issues;<br><br>Punctual experimentation autonomously with the mouse, when they feel they are in a controlled / reversible environment or after long observation of the screen). |                              | Alternative to double click: click + enter |

Table 5 – Strengths

### Conclusion:

There does not seem to be any structuring of content based on the interests of seniors.

About the methodology: faster pace than in the previous training. Faster, more memory challenging. The trainer was very quick and had some negative stimuli (pressure, showing wrong paths). The collective non-formal teaching methodology is not effective for identifying individual problems, which contributes to some feeling of “being lost” in classroom training.

- First class at Senior University Florbela Espanca, had 7 participants, with ages between 62 and 76 years old. This class has two level of students, some seniors had no digital skills and others low digital skills.

*Pain points:*

| Structure / Dynamics of training | Learning contents / Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Use of Hardware                                                                                                                           |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | Detect apps on the smartphone;<br><br>Menus and settings within apps;<br><br>Pop-up menus suggest confusing interaction;<br><br>Confusion of subtitles / buttons; faded colors and interaction with baseboards;<br><br>Navigate through windows and pop-up menus (eg outlook settings)<br>Difficulty navigating menus with more than one level of navigation;<br><br>File sharing via Google Drive;<br><br>Move files between folders;<br><br>Confusion between views (icon vs. list);<br><br>Preferences for email clients due to the layout stability in the software;<br><br>Edit, move or delete (the tendency is to redo (often redo without deleting what creates overlaps and conflicts of interaction);<br><br>Distinguish mouse icons;<br><br>Select text;<br><br>Confusion between click and double click; | Aim with the mouse at the desired object. Tendency to want to keep the mouse centered on the screen after interactions (reference point). |

Table 6 – Pain Points

### *Strengths:*

| Structure / Dynamics of training                         | Learning contents / Software                                                                                          | Use of Hardware          |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------|
| Interaction and questions actively asked by participants | Consult email;<br><br>Autonomous navigation between sites;<br><br>Bookmark bars in the browser facilitate navigation; | Write on the smartphone; |

Table 7 – Strengths

### *Results:*

Paused explanation and schematics on the board strongly help to understand the concepts (infographics - simplification of information). All participants take notes.

Class pacing is paused and considers the participants' questions. Participants seem to be at ease and interested in the trainer's considerations. The trainer first explains slowly, then illustrates and guides the participants.

Involvement of participants in the discussion and encouragement of knowledge sharing.

Explanation of the advantages and disadvantages of using a particular technology - finding points of interest in learning the software. Since explanations sometimes use concepts that are unknown (e.g., cookies, cache, etc.)

### Interviews

One of the primary research methods for direct contact with users, are interviews, to gather first-hand personal reports of experience, attitudes, opinions, and perceptions (Martin et al, 2012).

Interview scripts (Annex\_2)

| Difficulties                                                                                                                       | Overcoming points                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Difficulty in dealing with menus with more than 1 level, hidden (ex. Right button), submenus, collapsing menus or pop-up elements; | Consult email;                                                                            |
| Loss of direction / little ability to recover when lost in the menus;                                                              | Autonomous navigation between sites;                                                      |
| Identify file types (ppt, doc, etc.)                                                                                               | Bookmark bars in the browser facilitate navigation;                                       |
| Log out / log out vs. to switch off;                                                                                               | Easier to deal with static content or repetitive behavior / type of constant interaction; |
| Identify text selections;                                                                                                          |                                                                                           |
| Object overlays create fear of interacting;                                                                                        |                                                                                           |
| Edit, move, or delete. The trend is to redo.                                                                                       |                                                                                           |
| Detect apps on the smartphone;                                                                                                     |                                                                                           |
| Identify elements: captions / buttons; faded colors and interaction with baseboards;                                               |                                                                                           |
| File sharing via Google Drive                                                                                                      |                                                                                           |
| Move files between folders                                                                                                         |                                                                                           |
| Confusion between views (icon vs. list)                                                                                            |                                                                                           |
| Preferences for email clients due to the layout stability in the software;                                                         |                                                                                           |

### Training structure (face-to-face classes)

| Positive aspects                                                                                                                                                | Negative aspects                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Ease of learning in person and with guidance from the trainer;                                                                                                  | Non-personalized support (class for class), clarification of doubts when requested. |
| Peer-to-peer to clarify individual issues;                                                                                                                      | Difficulty in keeping up with the collective pace of training;                      |
| Autonomous punctual experimentation with the mouse, when they feel they are in a controlled / reversible environment or after a long observation of the screen; |                                                                                     |
| Paused instructions and repetition of content already given;                                                                                                    |                                                                                     |
| Need to take notes on paper and organize information linearly;                                                                                                  |                                                                                     |
| Visual organization of information;                                                                                                                             |                                                                                     |

Table 8 – General interview results

### Issues detected

| Designation               | Use / description                                                                                                                                                                                                                         | Comments                                                                                                                                      |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Using the mouse</b>    | Difficulty distinguishing and executing commands (click, double click, drag);<br><br>Preference for the trackpad after acquiring habit;<br><br>Difficulty distinguishing mouse icons;<br><br>Most used tool to interact with the computer | The mouse's dependence suggests a tactile deficiency and a complex sensory organization between the different components.                     |
| <b>Using the keyboard</b> | Less used tool;<br><br>More comfortable writing on the smartphone (perhaps due to the operation of the software and the integration of the keyboard);                                                                                     | The little use of the keyboard suggests that there is a fear of interacting with it, lack of dexterity or lack of memory to execute commands. |

Table 9 – General interview results

## Focus Groups

Focus groups is a qualitative method used to measure opinions, feelings, and attitudes from a group of specifically recruited participants about a product, service, marketing campaign, or a brand (Martin et al, 2012).

### Focus Groups Sessions (Annex\_3)

#### *Devices - Results*

##### Smartphone

| Positive aspects                                                | Negative aspects                                   |
|-----------------------------------------------------------------|----------------------------------------------------|
| very useful for specific tasks (payments, email, weather, etc.) | difficulty adapting to the small screen and the OS |
| most important and outstanding device                           | is not efficient as a work tool                    |
| minimizes loneliness and allows contact with families.          | there are a lot of people who still don't use      |
| Video calls and messaging are effective for contacting others   |                                                    |

### Tablet

| Positive aspects                                                                                                                                                             | Negative aspects                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| easier to use than the computer;<br>simpler;<br>more portable;<br>less complex to achieve an end similar to tasks performed on PC;<br>touch screen more intuitive than mouse | difficulty in adapting to the tablet's fluidity (feeling of loss and that the contents "run away")<br><br>smaller screen and keyboard size. |

### Computer

| Positive aspects                                                                                                                                       | Negative aspects                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| best for organizing information<br><br>best as a formal work tool<br><br>generosity in keyboard and screen sizes<br><br>Greater stability in controls; | a lot of hardware involved<br><br>expense to keep hardware up to date<br><br>fear of tampering given the apparent complexity and usage (due to excess hardware<br><br>difficulty working with the mouse (those who are used to using a trackpad do not need a mouse) |

Table 10 – General interview results

### Results

All participants recognized the value of having digital skills, to keep up to date both at work and at a personal level, thus combating social exclusion.

Face-to-face learning is identified as the most advantageous and most sought after, regardless of the degree of knowledge: it is more effective and saves time, since alone it would take longer.

Little self-education. They denote that there is a strong sense of mutual assistance (peer-to-peer) that greatly facilitates knowledge sharing and learning. The biggest difficulties encountered by older adults were the need to review / update / learn knowledge systematically.

Older adults need to be alerted to the risks of contacting other people online; often seniors are victims of scams or share sensitive information (online security).

Online education: loss of notion of the real value of goods (to be purchased).

As a rule, old adults only propose to learn / adapt if they have a real reason and a feeling that they cannot be left behind. Need daily training.

Working memory to memorize passwords and access data.



Figure 15 – Focus Group – Senior University Florbela Espanca, Matosinhos.

## Usability Tests

“Usability testing is an evaluative method that allows teams to observe an individual’s experience with a digital application as he or she walks through the steps of a given task (or set of tasks). The method is designed to help teams identify the parts of an interface that most regularly frustrate and confuse people so that they can be prioritized, fixed, and retested prior to launch (Martin et al, 2012)”

4 usability tests were carried out throughout the product development cycle.

### *Usability Test 1*

This first usability test had a sample of 8 participants, aged between 55 and 80 years. The test was carried out at the Senior University Florbela Espanca, in Matosinhos, and served to test the navigation and functionality of the ICTskills4all platform on the various devices - laptops and tablets.

Participants were given several tasks to perform (Annex\_4).

### *Usability Test 2*

This second usability test had a sample of 7 participants, aged between 55 and 76 years. The test was carried out at the Senior University Florbela Espanca, in Matosinhos, served to test the navigation of the ICTskills4all platform on the various devices, laptops and tablets.

The tasks given to the participants were the same given in the prior test (Annex\_5).



Figure 16 – Usability tests prototype



Figure 17 – Usability Tests at Senior University Florbela Espanca, Matosinhos.

### *Usability Test 3*

The third usability test had a sample of 6 participants, aged between 55 and 80 years. The test was carried out at the Senior University Florbela Espanca, in Matosinhos, and served to test the navigation, icons, colors and functionality of the ICTskills4all platform in the desktop computer.

We used the Think-aloud Protocol, that is one of the most common evaluative methods. It asks the participants to articulate what they are thinking, doing, or feeling as they complete a set of tasks.

Think-aloud Protocol (Annex\_6).

- Performance results

*Summary of results*

| Participants #     | Total Unassisted task Effectiveness [(%) complete] | Total Assisted Task Effectiveness [(%) complete] | Total errors | Total Deviations | Total Assists |
|--------------------|----------------------------------------------------|--------------------------------------------------|--------------|------------------|---------------|
| P1                 | 100%                                               | 100%                                             | 0            | 1                | 1             |
| P2                 | 100%                                               | 100%                                             | 0            | 3                | 2             |
| P3                 | 100%                                               | 100%                                             | 0            | 1                | 5             |
| P4                 | 100%                                               | 100%                                             | 0            | 1                | 3             |
| P5                 | 100%                                               | 100%                                             | 0            | 1                | 3             |
| P6                 | 100%                                               | 100%                                             | 0            | 1                | 1             |
| Mean               | 100%                                               | 100%                                             | 0            | 1,33             | 2,50          |
| Standard Deviation | 0%                                                 | 0%                                               | 0            | 0,82             | 1,52          |
| Min                | 100%                                               | 100%                                             | 0            | 1                | 1             |
| Max                | 100%                                               | 100%                                             | 0            | 3                | 5             |

Table 11 – Summary of results 3<sup>rd</sup> usability test

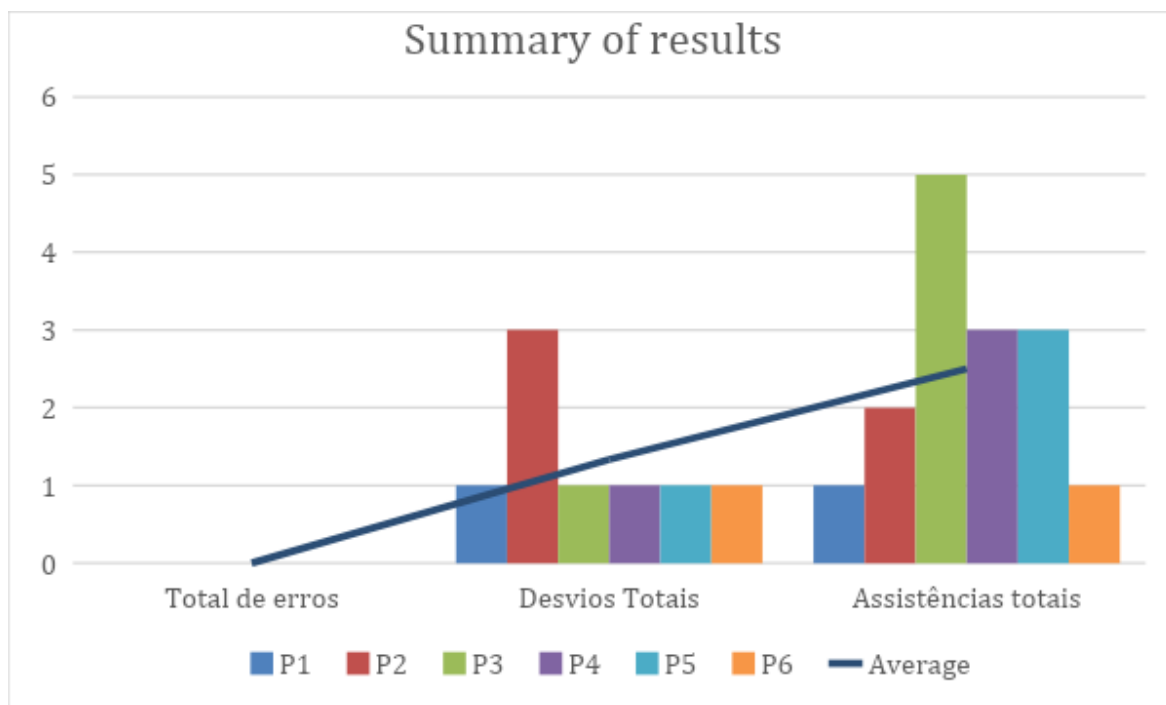


Figure 18 – Summary of results 3rd usability tests

### Summary Charts

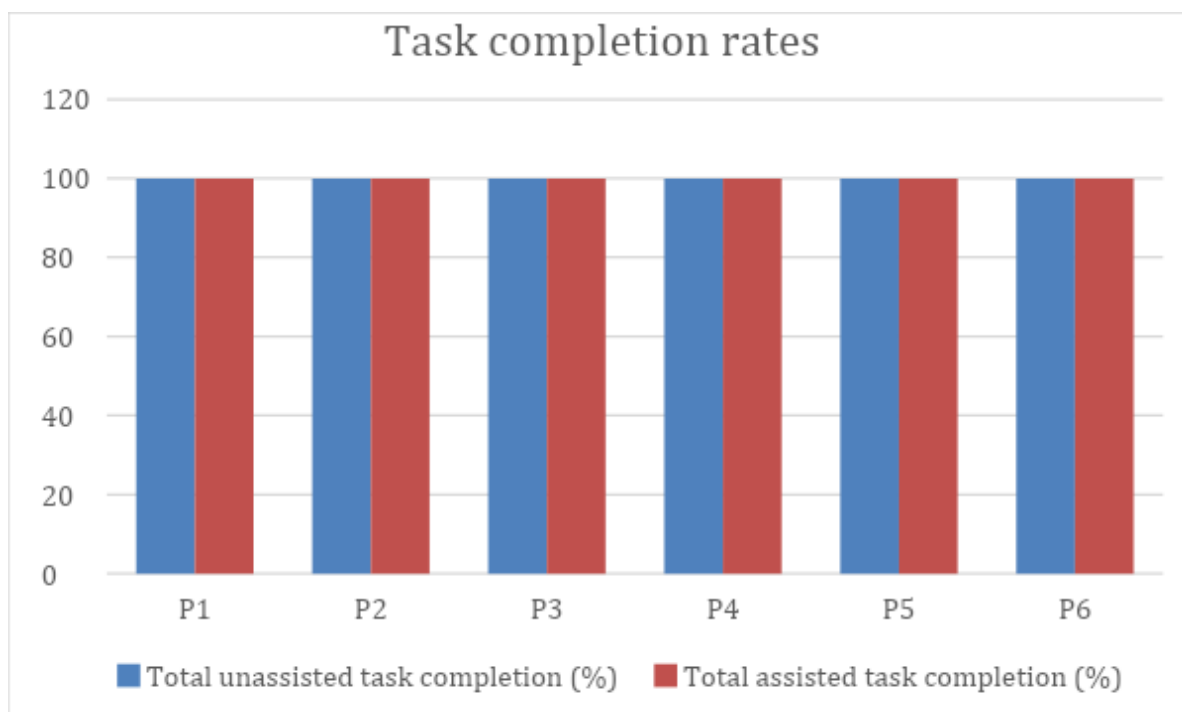


Figure 19 – Task completion rates

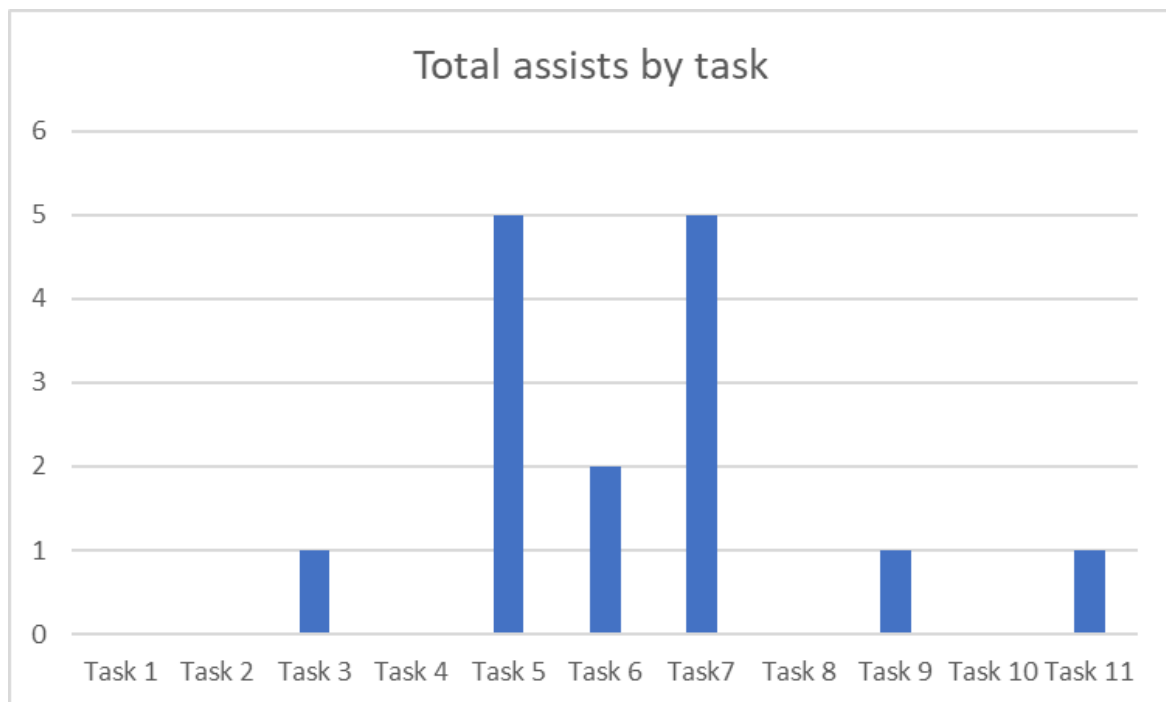


Figure 20 – Total assists by task.

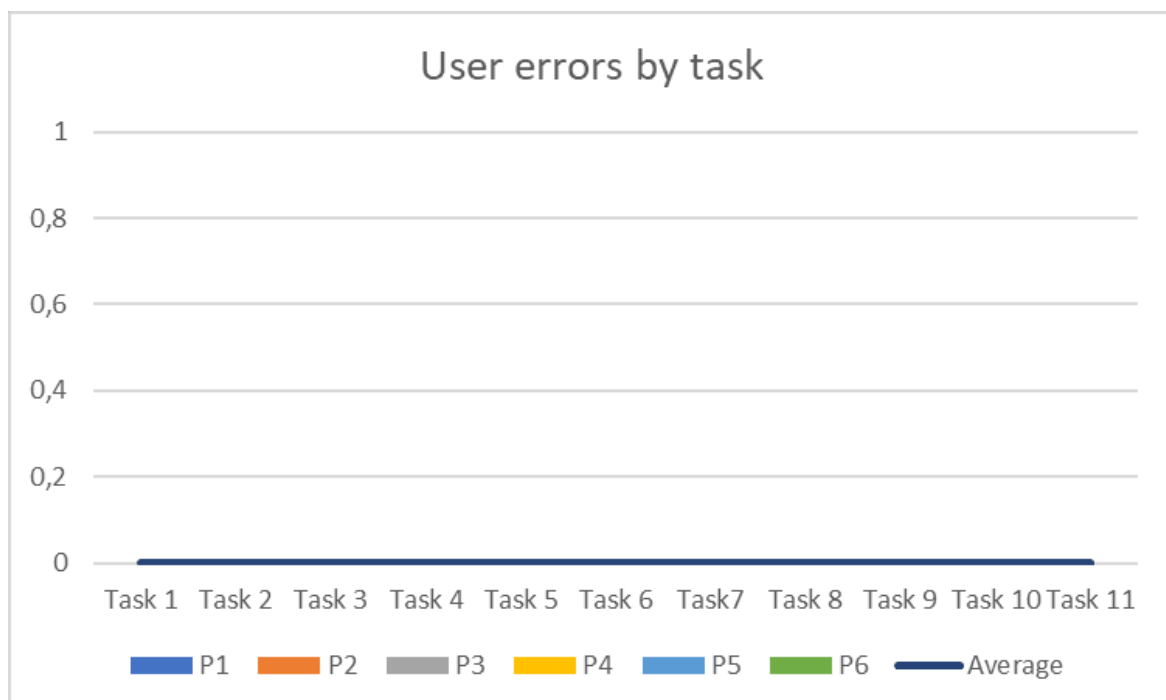


Figure 21 – User errors by task.

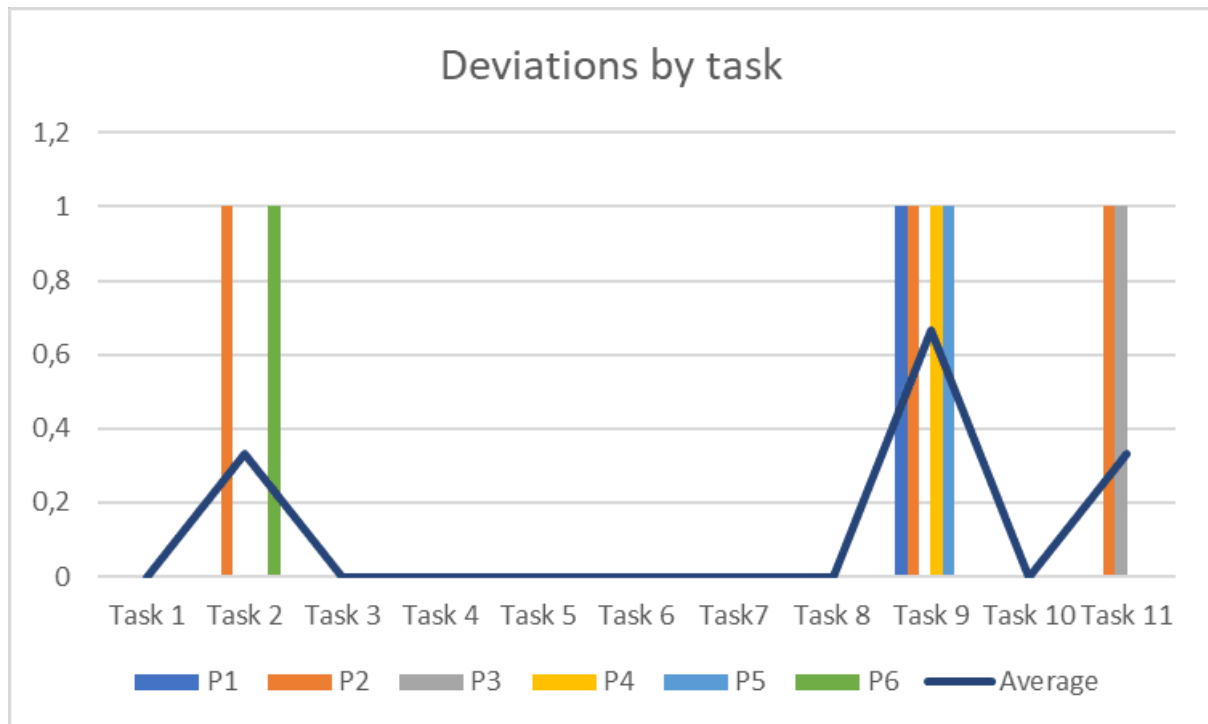


Figure 22 – Deviations by task.

These results, inform us about the effectiveness but also about efficiency, as the tasks 2, 9 and 11, are those in which the participants opted for alternative routes having therefore spent resources (+ time). As such, they are tasks whose User Interface - U.I can be further optimized to become more efficient.

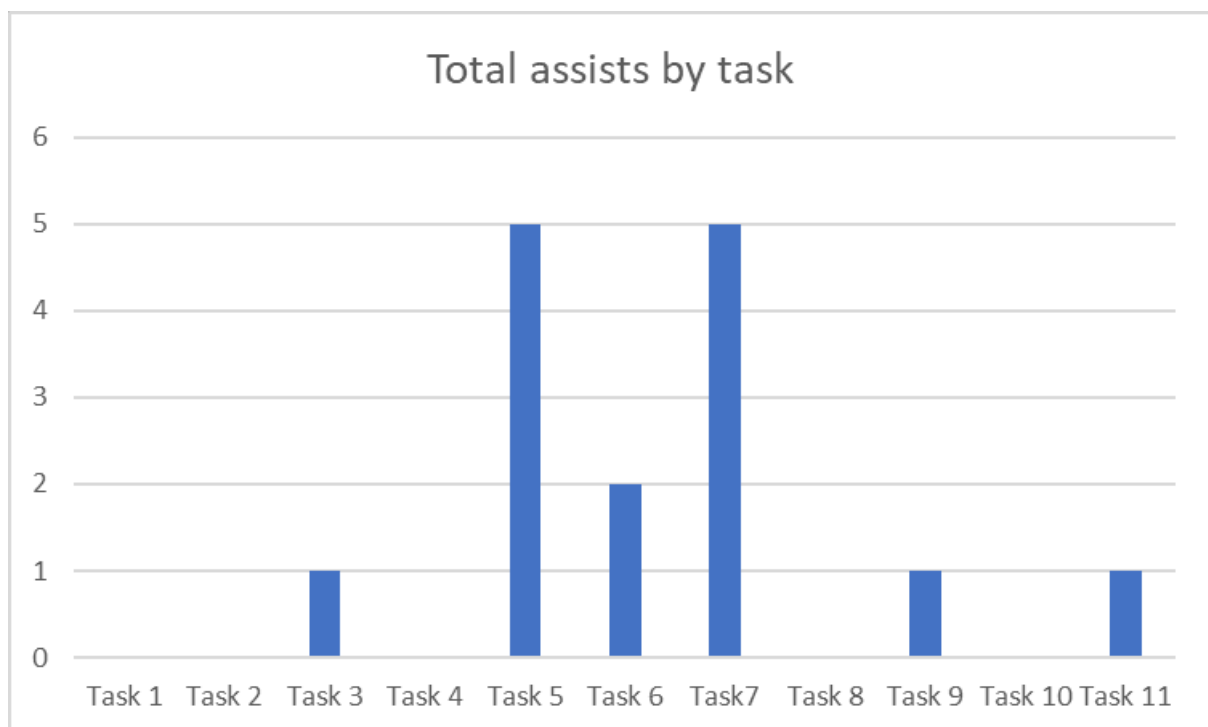


Figure 23 – Total assists by task.

It is interesting to observe that tasks 5 and 7 are notoriously the ones that motivate greater care in the U.I. This is directly related to Effectiveness as the ability and autonomy to perform a task without difficulty.

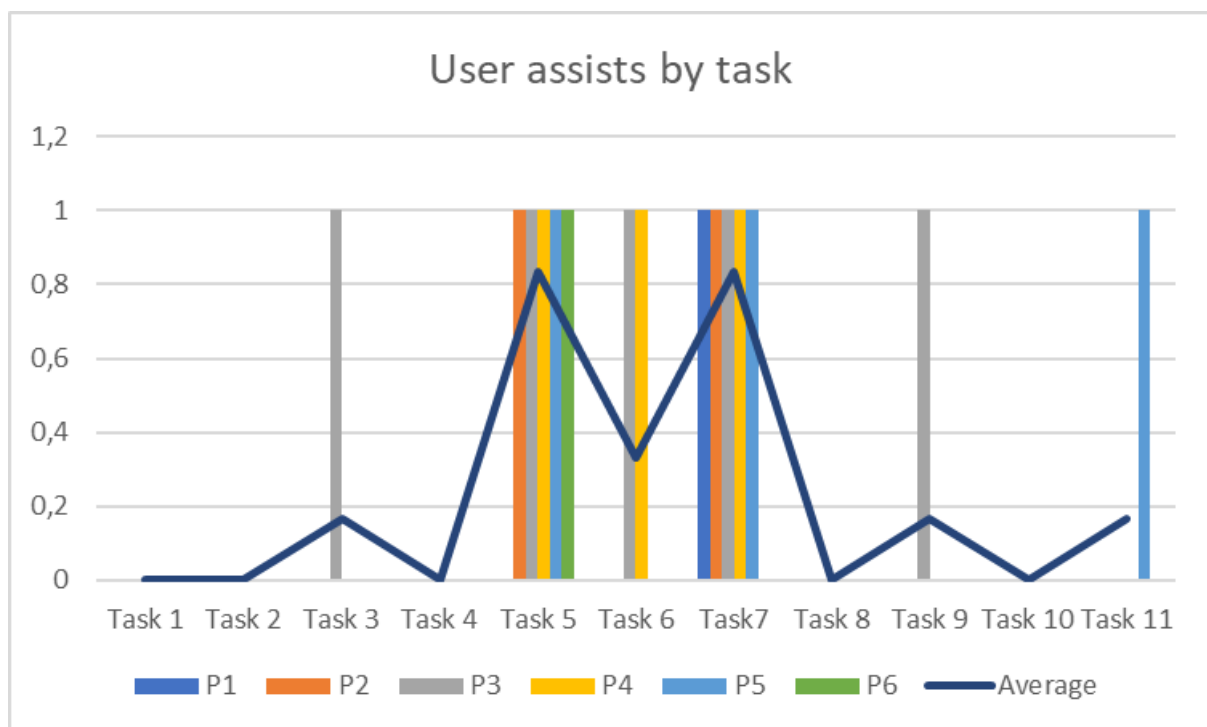


Figure 24 – User assists by task.

### *Satisfaction results – SUS - System Usability Scale scores and sub-scores*

| Participants #     | SUS (out of 100) | SUS Learnability Sub-score (out of 20) |
|--------------------|------------------|----------------------------------------|
| P1                 | 93               | 8                                      |
| P2                 | 78               | 7                                      |
| P3                 | 45               | 4                                      |
| P4                 | 48               | 1                                      |
| P5                 | 70               | 7                                      |
| P6                 | 75               | 6                                      |
| Mean               | 68,2             | 5,5                                    |
| Standard Deviation | 18,5             | 2,6                                    |
| Min                | 45               | 1                                      |

|     |    |   |
|-----|----|---|
| Max | 93 | 8 |
|-----|----|---|

Table 12 – SUS – System Usability Scale scores and sub-scores

*Satisfaction results – UEQ - User Experience Questionnaire scores and sub-scores*

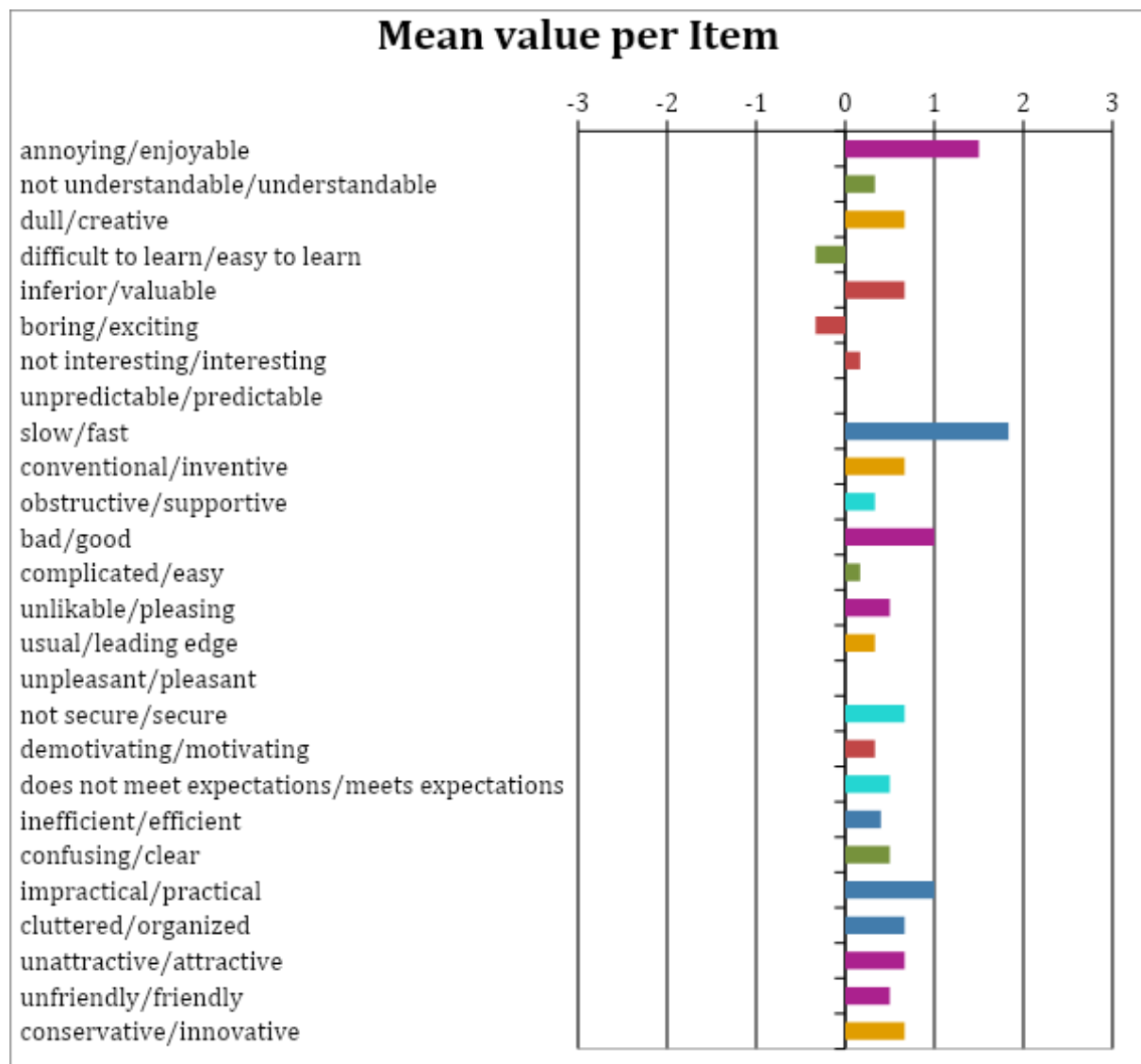


Figure 25 – UEQ – User Experience Questionnaire scores and sub-scores.

### *Usability Test 4*

The fourth usability test had a sample of 6 participants, aged between 55 and 74 years. The test was carried out online, due to the pandemic, and recorded by screen share. Was tested the navigation, contents, colors and functionality of the ICTskills4all platform in the desktop computer.

The approach used in this usability test was once more the Think-aloud Protocol. Participants were asked to articulate what they are thinking, doing, or feeling as they complete a set of tasks.

Think-aloud Protocol (Annex\_7).

### *Performance results*

| Participants #      | Unassisted Task Effectiveness [(%) complete] | Assisted Task Effectiveness [(%) complete] | Total errors | Total Deviations | Total Assists |
|---------------------|----------------------------------------------|--------------------------------------------|--------------|------------------|---------------|
| P1                  | 69,23%                                       | 100%                                       | 1            | 2                | 1             |
| P2                  | 100%                                         | 100%                                       | 0            | 2                | 1             |
| P3                  | 83,33%                                       | 100%                                       | 0            | 0                | 2             |
| P4                  | 100%                                         | 100%                                       | 0            | 0                | 1             |
| P5                  | 100%                                         | 100%                                       | 0            | 0                | 1             |
| P6                  | 100%                                         | 100%                                       | 0            | 0                | 0             |
| Mean                | 92,09%                                       | 100%                                       | 0,17         | 0,67             | 1,00          |
| Standard Deviations | 13,04%                                       | 0%                                         | 0,41         | 1,03             | 0,63          |
| Min                 | 69%                                          | 100%                                       | 0            | 0                | 0             |
| Max                 | 100%                                         | 100%                                       | 1            | 2                | 2             |

Table 13 – Summary of results 4<sup>th</sup> usability test

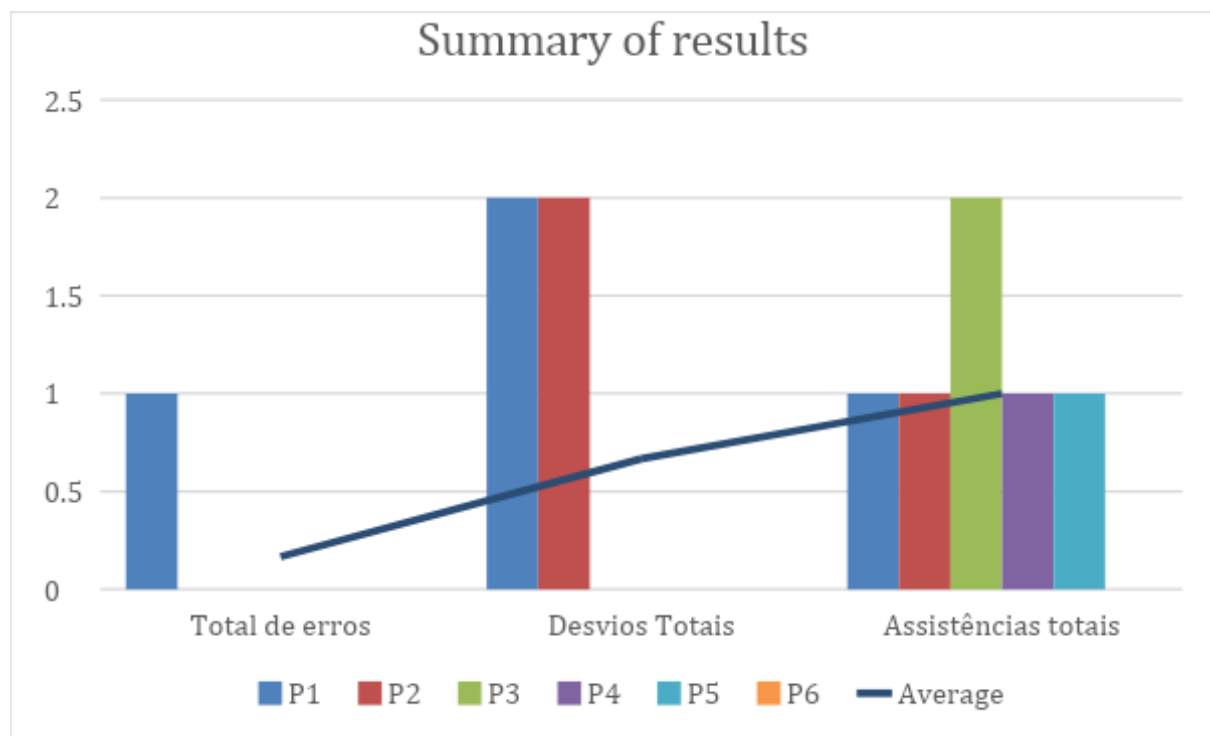


Figure 26 – Summary of results.

### Summary charts

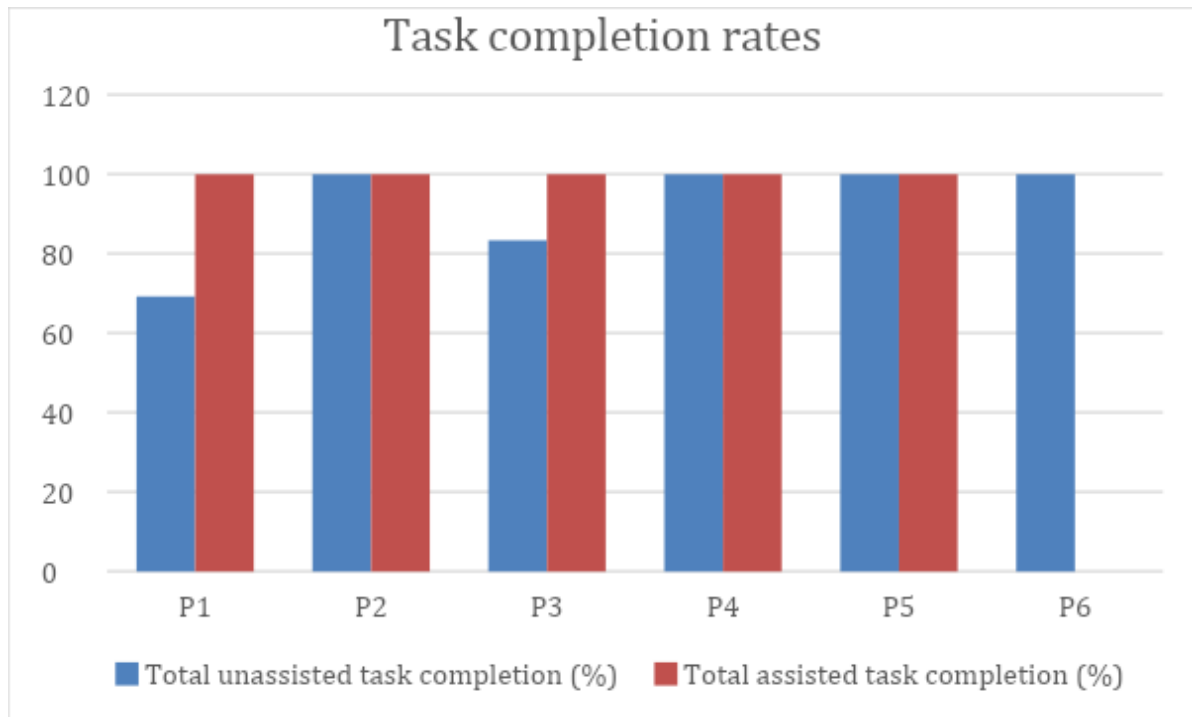


Figure 27 – Task completion rates.

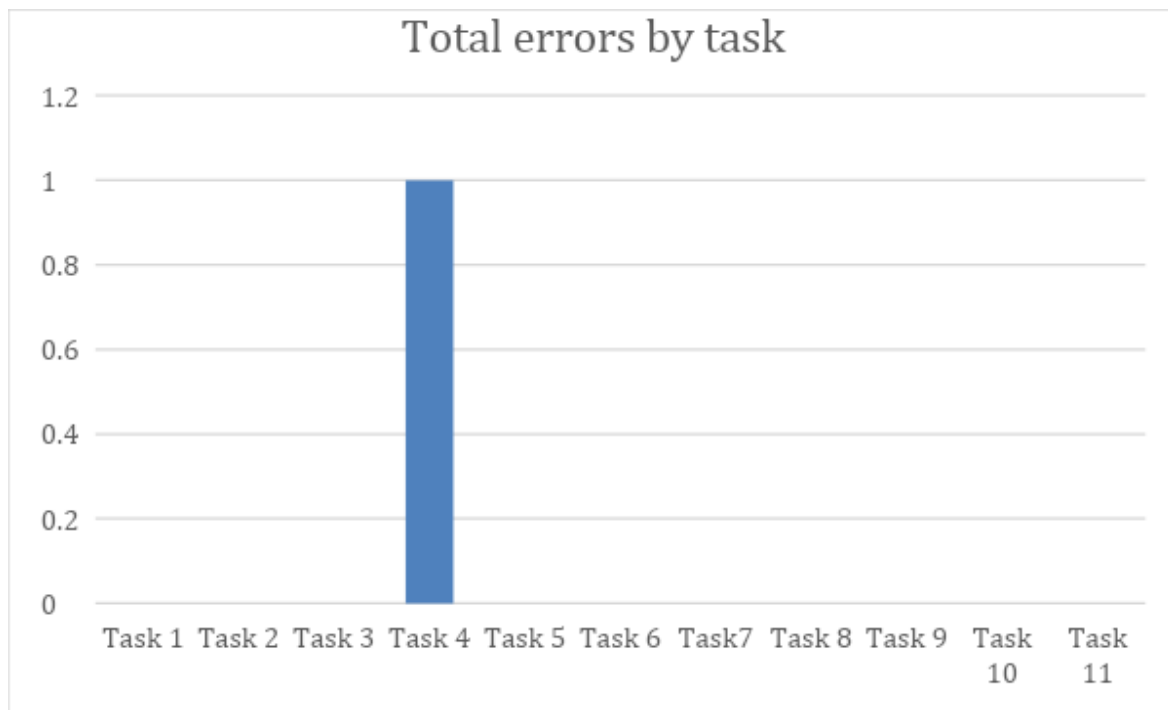


Figure 28 – Total errors by task.

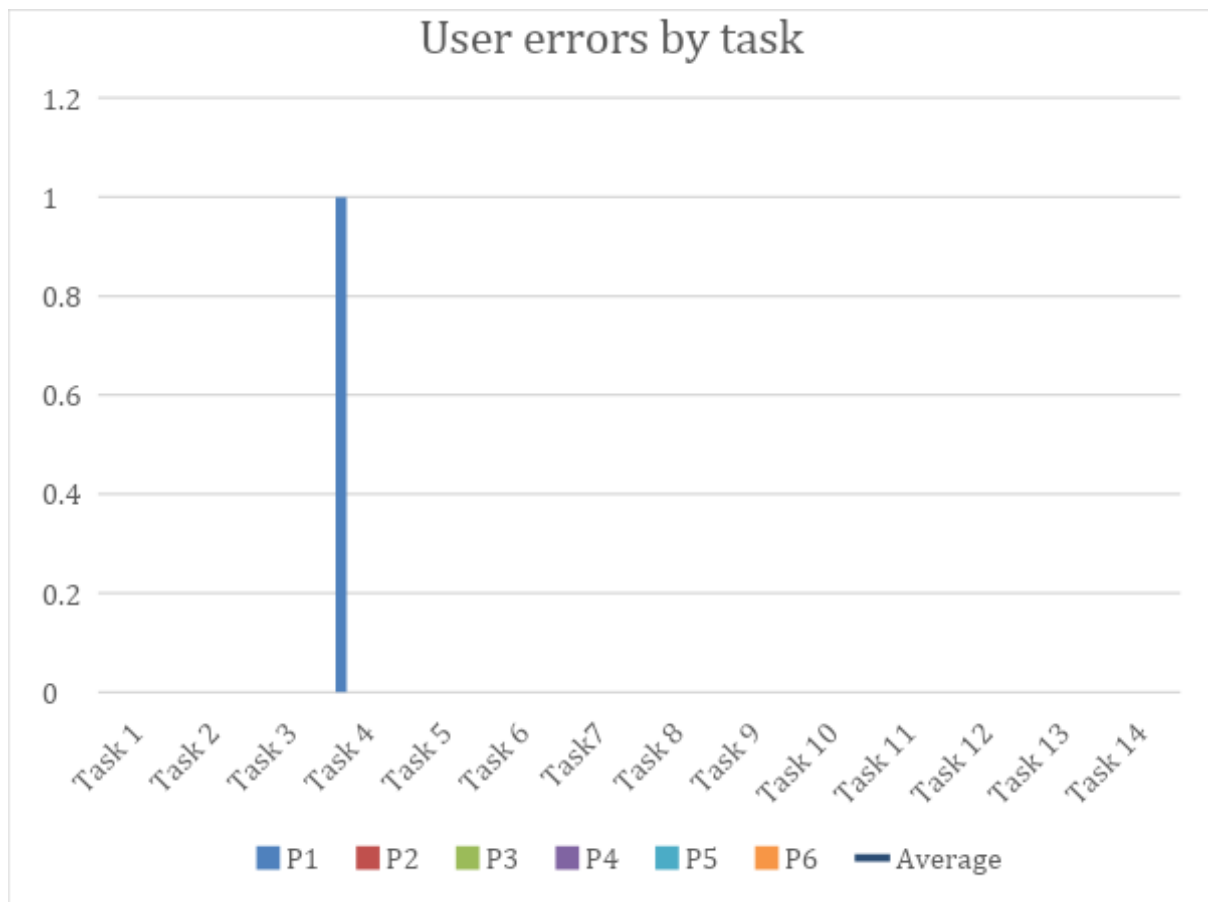


Figure 29 – User errors by task.

This chart tells us that task 4 and the respective UI features deserves to be revisited and improved in order to optimize the effectiveness in the Man-Machine dialogue.

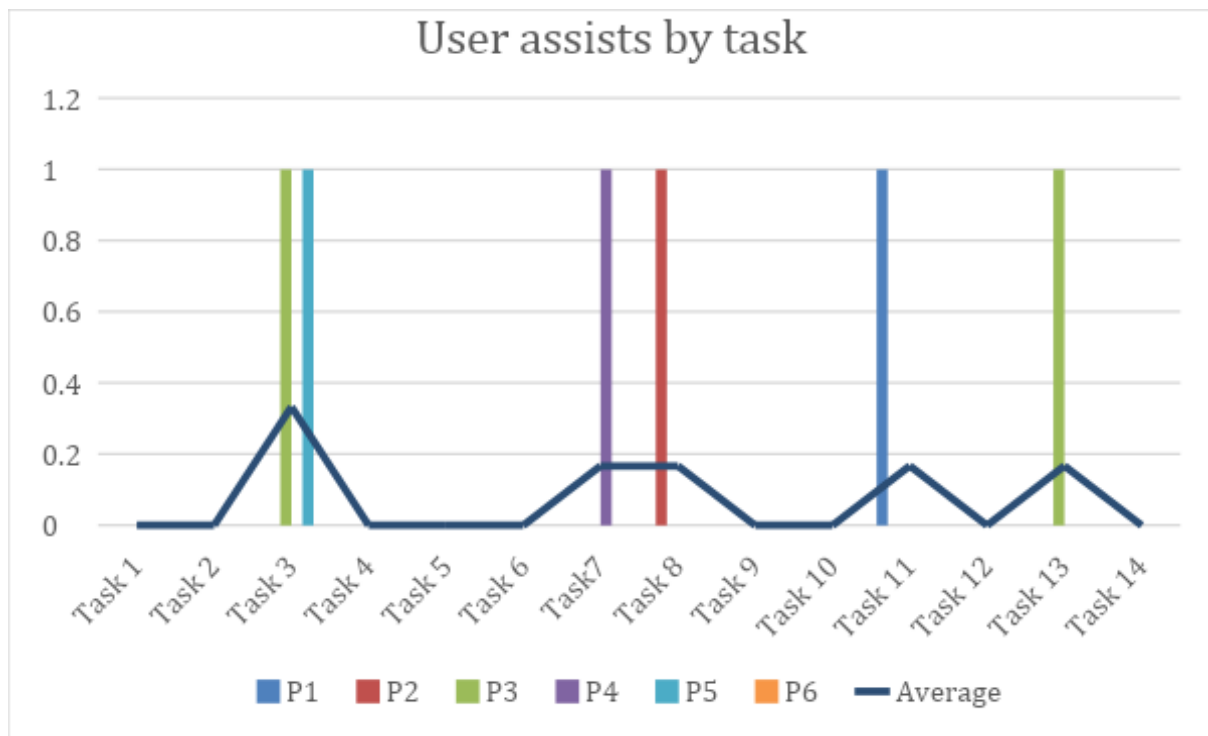


Figure 30 – User assists by task.

Once again, this chart informs us about the possibility of optimizing the effectiveness of the U.I in the 'features' that relate to tasks 3, 7, 8, 11 and 13. Assistance, tells us that it is not clear in the U.I. the execution of tasks enhancing the error (Effectiveness).

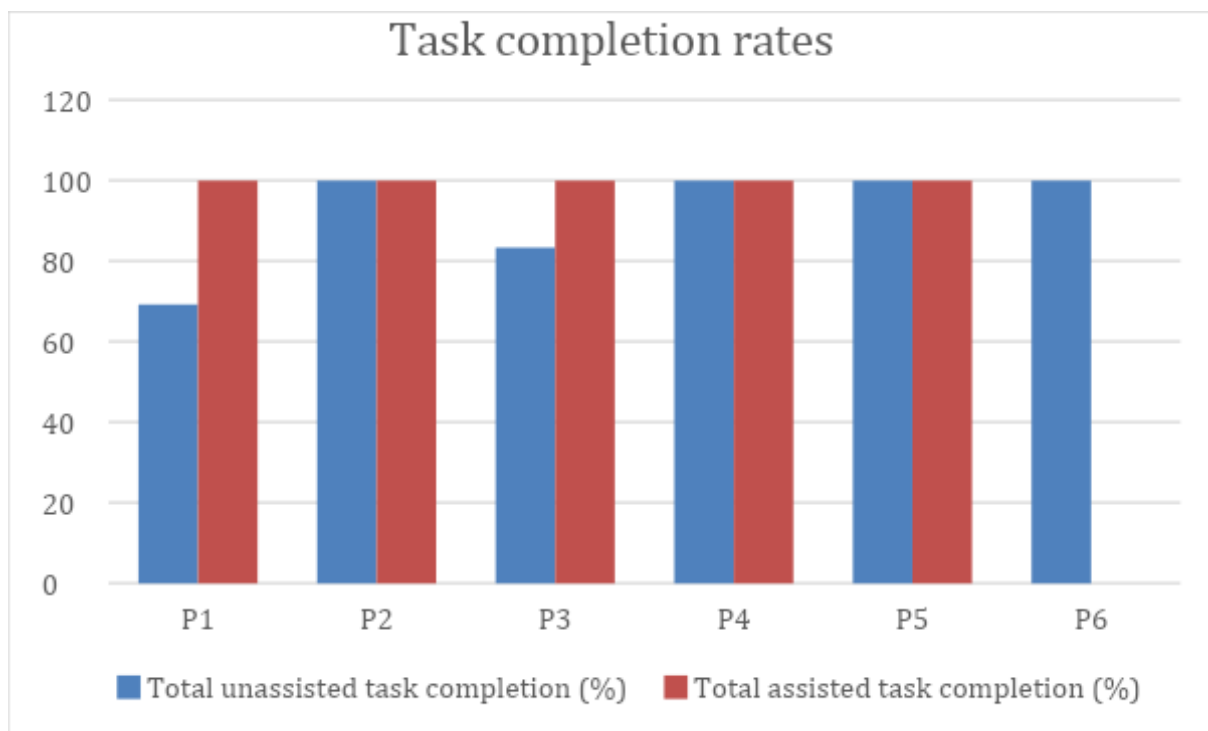


Figure 31 – Task completion rates.

*Satisfaction results – SUS - System Usability Scale scores and sub-scores*

| Participants #     | SUS (of 100) | SUS Learnability Sub-score (out of 20) |
|--------------------|--------------|----------------------------------------|
| P1                 | 80,00        | 12                                     |
| P2                 | 57,50        | 16                                     |
| P3                 | 42,50        | 0                                      |
| P4                 | 57,50        | 12                                     |
| P5                 | 55,00        | 8                                      |
| P6                 | 65,00        | 2                                      |
| Mean               | 59,6         | 8,3                                    |
| Standard Deviation | 12,4         | 6,3                                    |
| Min                | 42,5         | 0                                      |

|     |    |    |
|-----|----|----|
| Max | 80 | 16 |
|-----|----|----|

Table 14 – Satisfaction results - SUS – System Usability scores and sub-scores.

The results from the usability tests helped us to improve the effectiveness and efficiency of our learning website, according to the needs of the end user, in this case the older adults.



## CONCLUSION

Global population is rapidly ageing, the pace of population ageing is much faster than in the past (WHO, 2018), and most services are mainly offered online, especially now that humanity is facing a pandemic crisis. The most vulnerable population range are the older adults which increases the necessity to design accessible user interfaces (UI) that consider senior citizens' needs.

These needs are related to cognitive, perceptual, and psycho-motor changes that occur in the ageing process, which affect the way older people interact with digital devices.

Projecting for such a heterogeneous population, in its cultural references and digital literacy is a challenge to designers and developers. To achieve the goal that was aimed in this ICTskills4All project, the development of an inclusive and accessible learning platform, [www.ictskills4all.eu](http://www.ictskills4all.eu), and learning tools, a strategy was designed taking into account a user-centered design methodology.

This methodology enshrined participatory design sessions, usability tests, thus involving all stakeholders during the development cycle of the website to ensure that the needs of older adults (several dimensions: age, gender, physical, mental, and cognitive skills, expectations, lifestyle, socioeconomic backgrounds) were met.

Some concepts are particularly relevant to safeguard the inclusiveness of an interactive artifact. This is the case of the Design framework in which details some of the most important interaction design principles as well as interaction patterns.

The development of all the intellectual outputs of this project had brought us very important outcomes that were used in the project, and that will facilitate future work not only for this consortium but also for other entities that develop or

want to develop work, in the area of inclusion of older citizens through digitalization.

The outcomes of the research on the existing websites and learning tools were mainly important for the development of the Online platform and learning tools. Inherent to this work package is considered as a great asset the results of field observation of the older adults interacting with the electronic devices in the pilots and in the usability tests enabling a greater awareness of the needs of the target audience of the project along with the dissemination itself.

The main and collateral Intellectual Outcomes, as long as the formative experience of the university consortium's work, constitute therefore an underpinning stone to the future work in Human-Computer Interaction towards the empowerment of adult citizens.





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# ANNEXES

## Annex\_1 – Survey

### ICTskills4All: Digital skills in 55+ adults

ICTskills4All is an international project, funded by the European Commission under the Erasmus + KA2 program and coordinated by the University of Porto. The main objective of this project is to empower and promote the acquisition of digital skills among the 55+ population. With this vision in mind, we are committed to develop educational materials for distance and online learning, as well as face-to-face teaching programs.

Understanding the opinion and profile of the eventual beneficiaries of these services is, for us, crucial, which is the reason that supports the realization of this study prior to the development of these materials. This questionnaire is anonymous and voluntary, so the data will only be used for the purposes of statistical and scientific analysis. We thank you in advance for your time and your cooperation.

Expected duration: 7 minutes

More information:

<https://up.pt/ictskills4all>

Follow us at Facebook:

[www.facebook.com/ictskills4all](http://www.facebook.com/ictskills4all)

## A. Personal Profile

In this section we will ask you some information (gender; age group place of residence; professional status) with the aim of performing statistical and scientific analysis:

A1. Please tell us your gender

|      |                   |  |
|------|-------------------|--|
| A1.1 | Female            |  |
| A1.2 | Male              |  |
| A1.3 | Prefer not to say |  |

A2. Please tell us your age group

|      |       |  |
|------|-------|--|
| A2.1 | 55-59 |  |
| A2.2 | 60-64 |  |
| A2.3 | 65-69 |  |
| A2.4 | 70-74 |  |
| A2.5 | 75-79 |  |
| A2.6 | 80-84 |  |

|      |     |  |
|------|-----|--|
| A2.7 | 85+ |  |
|------|-----|--|

A3. City / area of residence (Write your answer below)

---

A4. What is your professional status?

|      |          |  |
|------|----------|--|
| A4.1 | Employed |  |
| A4.2 | Retired  |  |

## B. User's Profile

In this section we will ask some questions in order to understand your user's profile concerning ICT (Information and Information Technologies). Please bear in mind the questions on which you can select more than one option.

B1. How would you rate your ICT skills?

|      |                                                                                                                        |  |
|------|------------------------------------------------------------------------------------------------------------------------|--|
| B1.1 | Beginner (I know how to turn on a device/computer and its basic functions and components)                              |  |
| B1.2 | Basic User (I know how to use simple programs; however I still need support and to learn how to solve problems)        |  |
| B1.3 | Independent User (I know how to use a device and programs autonomously, even though I still need support occasionally) |  |
| B1.4 | Advanced User (I know how to use devices and software and I can solve most problems by myself)                         |  |

B2. What is your motivation to learn ICT skills?  
(Please chose one or more options)

|      |                                                      |  |
|------|------------------------------------------------------|--|
| B2.1 | Acquire competences for the labor market             |  |
| B2.2 | Curiosity                                            |  |
| B2.3 | Keep up to date with the latest technological trends |  |
| B2.4 | Keep socially active                                 |  |
| B2.5 | Keep in touch with other people                      |  |
| B2.6 | Acquire knowledge or gather information              |  |
| B2.7 | None of the above                                    |  |

B3. In your opinion, what are the advantages of learning ICT skills for people of your age group? (If you do not find advantages, please say it so using the option 'I do not find advantages')

(Please chose one or more options)

|      |                                                      |  |
|------|------------------------------------------------------|--|
| B3.1 | Acquire competences for the labor market             |  |
| B3.2 | Access goods and services                            |  |
| B3.3 | Keep up to date with the latest technological trends |  |
| B3.4 | Maintain an autonomous lifestyle                     |  |
| B3.5 | It is a positive cognitive stimulus                  |  |

|      |                                  |  |
|------|----------------------------------|--|
| B3.6 | Helps keeping socially active    |  |
| B3.7 | Being in touch with other people |  |
| B3.8 | I do not find advantages         |  |

B4. What do you believe are the main barriers for people of your age group to learn ICT skills?

(Please chose one or more options)

|      |                                                                                    |  |
|------|------------------------------------------------------------------------------------|--|
| B4.1 | Difficulty adapting to new technologies and their updates                          |  |
| B4.2 | Health issues (ex. lack of short-term memory, visual acuity, or fine motor skills) |  |
| B4.3 | Complexity of interacting with multiple components (screen, mouse, and keyboard)   |  |
| B4.4 | Feeling of rejection towards an increasing technological society                   |  |
| B4.5 | Difficulty accessing training programs                                             |  |
| B4.6 | Inherent costs of buying equipment or keeping devices updated                      |  |
| B4.7 | Other:                                                                             |  |

B5. Do you have any task or computer program you are interested in learning or acquiring more knowledge about? If so, which program(s) or task(s)?

---

B6. Identify, if any, what content or programs you would like to learn or deepen your knowledge.

(Please write your answer below)

---

B7. What are the tools or computer programs you use more often or are more useful to you?

(Please write your answer below)

---

B8. Using the computer, which programs or tasks appear to be more difficult? Or which were the most challenging to learn? (Please chose one or more options)

|       |                                                              |  |
|-------|--------------------------------------------------------------|--|
| B7.1  | Starting session in the computer                             |  |
| B7.2  | Turning off the computer                                     |  |
| B7.3  | Accessing and using email                                    |  |
| B7.4  | Surf on the internet                                         |  |
| B7.5  | Using social media                                           |  |
| B7.6  | Microsoft PowerPoint (or similar programs)                   |  |
| B7.7  | Microsoft Word (or similar programs)                         |  |
| B7.8  | Microsoft Excel (or similar programs)                        |  |
| B7.9  | Finding files using Explorer (on Windows) or Finder (on Mac) |  |
| B7.10 | Using clouds or drive                                        |  |
| B7.11 | Execute commands using the keyboard                          |  |
| B7.12 | Searching information online (using search engines)          |  |
| B7.13 | Watch vídeos/movies                                          |  |

|       |                                             |  |
|-------|---------------------------------------------|--|
| B7.14 | Watch videos/movies online                  |  |
| B7.15 | Accessing e-services (bank, finances, etc.) |  |
| B7.16 | Online shopping                             |  |
| B7.17 | Using Skype or other communication apps     |  |
| B7.18 | Configuring the computer (Settings)         |  |
| B7.19 | See/edit pictures                           |  |
| B7.20 | Listen to music                             |  |
| B7.21 | Edit videos                                 |  |
| B7.22 | Playing games                               |  |
| B7.23 | Other:                                      |  |

### C. Mobile Devices

In this section we will be looking at your user's profile with special focus on mobile devices - mobile (smartphone) and tablet.

C1. Do you use smartphone regularly?

|      |                           |  |
|------|---------------------------|--|
| C1.1 | Yes                       |  |
| C1.2 | No (please proceed to C3) |  |

## C2. Which tasks do you usually perform on your smartphone?

(Please choose one or more options)

|       |                                                           |  |
|-------|-----------------------------------------------------------|--|
| C2.1  | Calls and messages                                        |  |
| C2.2  | Take pictures and record video                            |  |
| C2.3  | Check the weather                                         |  |
| C2.4  | Shopping                                                  |  |
| C2.5  | Be on social media                                        |  |
| C2.6  | Make payments                                             |  |
| C2.7  | Read the news                                             |  |
| C2.8  | Surf online                                               |  |
| C2.9  | Listen to music                                           |  |
| C2.10 | Watch films or videos                                     |  |
| C2.11 | Access e-services (bank, transports, health, etc.)        |  |
| C2.12 | Use GPS and maps                                          |  |
| C2.13 | Use communication apps (Messenger, WhatsApp, Skype, etc.) |  |
| C2.14 | Use PayPal                                                |  |
| C2.15 | Play games                                                |  |
| C2.16 | Using email                                               |  |
| C2.17 | Other:                                                    |  |

C3. Have you used a tablet before?

|      |                           |  |
|------|---------------------------|--|
| C3.1 | Yes                       |  |
| C3.2 | No (please proceed to C5) |  |

C4. Which tasks do you usually perform on a tablet?

(Please choose one or more options)

|       |                                                           |  |
|-------|-----------------------------------------------------------|--|
| C4.1  | Calls and messaging                                       |  |
| C4.2  | Take pictures and record video                            |  |
| C4.3  | Check the weather                                         |  |
| C4.4  | Shopping                                                  |  |
| C4.5  | Be on social media                                        |  |
| C4.6  | Make payments                                             |  |
| C4.7  | Read the news                                             |  |
| C4.8  | Surf online                                               |  |
| C4.9  | Read documents                                            |  |
| C4.10 | Watch films or videos                                     |  |
| C4.11 | Listen to music                                           |  |
| C4.12 | Access e-services (bank, transports, health, etc.         |  |
| C4.13 | Read e-books or e-magazines                               |  |
| C4.14 | Use communication apps (Messenger, WhatsApp, Skype, etc.) |  |

|       |                      |  |
|-------|----------------------|--|
| C4.15 | Use MB Way or PayPal |  |
| C4.16 | Write documents      |  |
| C4.17 | Play games           |  |
| C4.18 | Using email          |  |
| C4.19 | Other:               |  |

C5. Do you see advantages using the tablet compared with the computer? If so, which ones? (In case you do not, select the option 'I do not identify advantages')

(Please choose one or more options)

|      |                                                      |  |
|------|------------------------------------------------------|--|
| C5.1 | It is simpler because it has less components         |  |
| C5.2 | The touch screen makes it easier to interact with    |  |
| C5.3 | Keep up to date with the latest technological trends |  |
| C5.4 | The software is easier to understand                 |  |
| C5.5 | It is easier to surf online                          |  |
| C5.6 | I do not identify advantages                         |  |
| C5.7 | Other:                                               |  |

## D. Online Safety

This section is dedicated to online safety and how you use the internet.

D1. Do you usually surf online?

|      |                           |  |
|------|---------------------------|--|
| D1.1 | Yes                       |  |
| D1.2 | No (please proceed to D3) |  |

D2. What do you usually do online?

---

D3. Do you regard online safety as an important learning topic?

(Please choose one option)

|      |                                      |  |
|------|--------------------------------------|--|
| D3.1 | Yes                                  |  |
| D3.2 | No                                   |  |
| D3.3 | I do not have opinion on this matter |  |

E. Please rate the following statements according to the following scale: 1

- Strongly disagree; 2 - Disagree; 3 - I do not agree nor disagree/I have no opinion; 4 - Agree; 5 - Strongly agree.

(Select a number from 1 to 5)

|                                                                                                                                                       |   |   |   |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| E1. "Knowing how to use mobile devices is an important skill to have a more active lifestyle and to foster social inclusion amongst all generations." |   |   |   |   |
|                                                                                                                                                       |   |   |   |   |
| 1                                                                                                                                                     | 2 | 3 | 4 | 5 |

|                                                                                                                             |   |   |   |   |
|-----------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| E2. "Acquiring digital skills is important to ensure professional inclusion amongst all generations professionally active." |   |   |   |   |
|                                                                                                                             |   |   |   |   |
| 1                                                                                                                           | 2 | 3 | 4 | 5 |

|                                                                                                                                            |   |   |   |   |
|--------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| E3. "Knowing how to navigate online is an important skill for a more active lifestyle and to promote social inclusion of all generations." |   |   |   |   |
|                                                                                                                                            |   |   |   |   |
| 1                                                                                                                                          | 2 | 3 | 4 | 5 |

|                                                                      |   |   |   |   |
|----------------------------------------------------------------------|---|---|---|---|
| E4. "Using the internet contributes to minimizing family isolation." |   |   |   |   |
|                                                                      |   |   |   |   |
| 1                                                                    | 2 | 3 | 4 | 5 |

## Annex\_2 – Interview Scripts

### Individual interviews with end users

- What are your motivations for learning ICT and using a computer?
- How do you think it is useful for people of your generation?
- What are the main difficulties for people of your age group in using the computer?
- And use programs, browse the internet, check e-mail, etc.?
- How do you feel most limited?
- And what challenges do you consider overcome? Or which tools do you know best, and which are useful to you?
- Already a smartphone user? And tablets?
- Do you think they are important devices today?
- Do you consider that tablets, because they are touch sensitive and have fewer components, are easier to use than computers?
- Starting from a level of knowledge 0, what is the best strategy, in your opinion, to start learning ICT?
- Can you imagine learning ICT on your own?
- In the event that you can learn ICT on your own, how would you like to feel supported? How would you like to ask for support and how would you like to be contacted?
- If you started from 0 and had a choice, would you choose a tablet or a computer?

## **Annex\_3 – Focus Group sessions**

### *Sessions Script*

#### **Moment 1 - Group dynamics - Presentation (15 min)**

Adaptation without balloons: Paper with written name. We shuffled the papers and asked the person that name a question. we repeat 3 times and then introduce ourselves based on this information.

#### **Moment 2 – Focus Group (30/40 min)**

(Present the activity: explain that it is not a process to evaluate them, that we are trying to understand this audience and design optimized materials for them).

#### **Questions to explore:**

- What are your motivations for learning ICT and using a computer?
- How do you think it is useful for people of your generation?
  
- What are the main difficulties for people of your age group in using the computer?
- How do you feel most limited?
- And what challenges do you consider overcome? Or which tools do you know best, and which are useful to you?
  
- Already a smartphone user? And tablets?
- Do you think they are important devices today?

- Do you consider that tablets, because they are touch sensitive and have fewer components, are easier to use than computers?
- Starting from a level of knowledge 0, what is the best strategy, in your opinion, to start learning ICT?
- Can you imagine learning ICT on your own?
- In the event that you can learn ICT on your own, how would you like to feel supported? How would you like to ask for support and how would you like to be contacted?
- If you started from 0 and had a choice, would you choose a tablet or a computer?

(Coffee break – 10 min)

### Moment 3 – Creative Process - Brainstorming (30 min)

(Present activity: creative process, let's do a brainstorming session)

Questions to explore:

- Which digital tools do you think are most important today?
- What are you most interested in learning?
- What would you like to learn that you have not yet learned?
- What do you think is most important to learn today, given the current social and technological outlook?
- And to be in the job market?
- Explore mobile and tablet usage.

## **Annex\_4 – 1<sup>st</sup> Usability Test Tasks**

### **Task 1**

Find the instructional video to learn how to navigate on the website.

### **Task 2**

Go to the Learning Themes section and enter the "Online Safety" theme.

2.1 Once inside the theme, look for content 2 - "How to detect a malicious website";

2.2 Then go to content 3 - "Online privacy";

2.3 Go to the next content, number 4.

### **Task 3**

Go to the Learning Themes again and go to the "Mobile devices" theme.

### **Task 4**

Go to the Help section, go to the frequently asked questions.

Select the first question.

## **Annex\_5 – 2<sup>nd</sup> Usability Test Tasks**

### **Task 1**

Find the instructional video to learn how to use the website, according to the device you are on.

### **Task 2**

Access the Learning Theme "Online Safety".

Once inside the theme, look for content 5 - " How to download content or download it safely?";

### **Task 3**

Skip to content 4 "Online Privacy".

### **Task 4**

Go to the Help section. Look for the Frequently Asked Questions. Open the first question.

## Annex\_6 – 3<sup>rd</sup> Usability Test

### Think Aloud Protocol

#### 1.1 Participant general instructions

Participants should receive the following information regarding the project:

ICTskills4All is an international project, funded by the European Union under the Erasmus+ KA2 program, coordinated by the University of Porto and developed under the scope of the Competence Centre for Active and Healthy Ageing at the University of Porto – Porto4Ageing which aims to develop projects in the active and healthy aging area.

The ICTskills4All.eu website aims to develop digital skills through courses and educational content, developed specifically for the population over 55 whose skills in this field are reduced. ICTskills4All.eu represents a contribution to improve the quality of life and autonomy of senior citizens, aiming at a positive impact on the adult and senior education sector in digital environments and following the current trend in the educational sector and information society.

This test is confined to the desktop computer context, to test the usability of the website.

Regarding the prototypes:

You can then use the computer to browse the website and discover the information it contains. Do you have any question regarding the procedure?

Screening test:

I would like to start by asking you some questions:

- How old are you?

- What is your schooling?
- What is your profession? (If retired, ask what was the previous job)
- Do you use a computer? Do you use a smartphone? If not, you have already used a smartphone or other touch device?

Regarding the test:

*First of all, I would like to ask for your permission to film the test under the compromise that these images are for research purposes only and will not be shown to anyone other than the researchers working on the results of this test. I would also like to ask you to read and please sign this informed consent form.*

*Our goal now is to evaluate the usability of this website and for that we will ask you to perform some tasks using the website in the computer. I will explain the task, you can ask me anything you do not understand about it and then you can try to accomplish the task. Try to do it as if I was not here but if you feel that you are stuck you can ask me for assistance. You can also voice your opinions regarding any aspect of the prototypes. Remember that we are the website and not the user, and that there is no right or wrong way to perform a task. Also, we are looking for both good or bad feedbacks so do not refrain from expressing a bad opinion or point out any errors that you may encounter. They are expected and we appreciate if you let us know.*

Regarding the website structure:

*This website is translated into four languages and allows the user with few digital skills to learn how to use a desktop computer, laptop, tablet and smartphone to write, surf the internet, shop, contact social networks.*

*All the contents are fictional...*

*Any questions?*

## 1.2 Participants task instructions

Participants were asked to try and complete the following tasks:

1. Change the language to English.  
Ideal Flow: [Click Portuguese button -> Click English button]
2. From the previous screen, return to the homepage.  
Ideal Flow [Click Back button]
3. On the Homepage, increase the font size to medium.  
Ideal Flow [Click accessibility menu - > (second letter)]
4. Increase the font size to large.  
[Click accessibility menu - > (third letter)]
5. Choose a video on Online Safety.  
Ideal Flow: [Click the Learning Theme button -> Click Online Safety button / or icon / or View contents - > Click watch video]
6. From the previous screen, choose a video on Browse Online.  
Ideal Flow: [Click the Learning Themes button -> Click the Browse Online button / or icon / or View contents - > Click watch video]
7. Do a search on courses.  
Ideal Flow [Click the magnifying glass icon -> Write courses]
8. Open the Facebook connection.  
Ideal Flow: [Click one of the Facebook icons]
9. Access to Help and Contacts through the Site Map.  
Ideal Flow: [Click Site Map button -> Click Help and Contacts button]
10. Fill out and submit Help form.  
Ideal Flow: [Click Help and Contacts -> Click icon / or Send Email -> Click Send button]
11. From the previous screen access the Frequently Asked Questions.  
Ideal Flow: [Click back button to Help and Contacts - > Click icon / or frequently Asked Questions]

After the test and questionnaires:

Do you have any questions or comments? Thank you very much for your participation in this test, your opinion is very valuable to us.

**References:**

National Institute of Standards and Technology, NISTIR 7432 – Common Industry Specification for Usability – Requirements, 2007

## Annex\_7 – 4<sup>th</sup> Usability Test

### Think Aloud Protocol

#### 1.1 Participant general instructions

Participants should receive the following information regarding the project:

ICTskills4All is an international project, funded by the European Union under the Erasmus+ KA2 program, coordinated by the University of Porto and developed under the scope of the Competence Centre for Active and Healthy Ageing at the University of Porto – Porto4Ageing which aims to develop projects in the active and healthy aging area.

The ICTskills4All.eu website aims to develop digital skills through courses and educational content, developed specifically for the population over 55 whose skills in this field are reduced. ICTskills4All.eu represents a contribution to improve the quality of life and autonomy of senior citizens, aiming at a positive impact on the adult and senior education sector in digital environments and following the current trend in the educational sector and information society.

This test is confined to the desktop computer context, to test the usability of the website.

Regarding the prototypes:

You can then use the computer to browse the website and discover the information it contains. Do you have any question regarding the procedure?

Screener test:

I would like to start by asking you some questions:

- How old are you?

- What is your schooling?
- What is your profession? (If retired, ask what was the previous job)
- Do you use a computer? Do you use a smartphone? If not, you have already used a smartphone or other touch device?

#### Regarding the test:

First of all, I would like to ask for your permission to film the test under the compromise that these images are for research purposes only and will not be shown to anyone other than the researchers working on the results of this test. I would also like to ask you to read and please sign this informed consent form.

Our goal now is to evaluate the usability of this website and for that we will ask you to perform some tasks using the website in the computer. I will explain the task, you can ask me anything you do not understand about it and then you can try to accomplish the task. Try to do it as if I was not here but if you feel that you are stuck you can ask me for assistance. You can also voice your opinions regarding any aspect of the prototypes. Remember that we are the website and not the user, and that there is no right or wrong way to perform a task. Also, we are looking for both good or bad feedbacks so do not refrain from expressing a bad opinion or point out any errors that you may encounter. They are expected and we appreciate if you let us know.

#### Regarding the website structure:

This website is translated into four languages and allows the user with few digital skills to learn how to use a desktop computer, laptop, tablet and smartphone to write, surf the internet, shop, contact social networks.

You will find various types of contents: text, images, illustrations and video.

Any questions?

## 1.2 Participants task instructions

Participants were asked to try and complete the following tasks:

1. Change the language to English.  
Ideal Flow: [Click Portuguese button -> Click English button]
2. From the previous screen, return to the homepage.  
Ideal Flow [Click Back button]
3. On the Homepage, increase the font size to large.  
Ideal Flow [Click accessibility menu - > (third letter)]
4. Access the menu How to navigate the website and start the introduction video.  
[Click How to navigate the website menu - > click the Play button on the video]
5. In the same video, enlarge the screen.  
Ideal Flow: [Click the Full screen video]
6. In the same video, download the video to the computer.  
Ideal Flow: [Click the download button]
7. Access a learning content about the Monitor.  
Ideal Flow [Click on Learning Topics -> Click ob Basic/ or icon/ or View Contents - > Click on What is a computer?/ or icon/ or View Contents - > Click on Monitor/or icon / or View Contents]
8. Access content How to create an email account.  
Ideal Flow: [Click on Learning Topics in the main menu/ or in the upper path - > Click on Use email/ or icon/ or View Contents -> Click Create an email account/ or icon/ or View Contents -> Click Play button]
9. Access printable support material How to use the mouse.  
Ideal Flow: [Click on Learning Topics in the main menu -> Click on Support material for printing/ or icon/ or View Contents -> Click How to use the mouse/ or View Contents]

10. Doing a search on ergonomics.  
Ideal Flow: [Click the magnifying glass icon -> Type ergonomics]
11. Open the Facebook connection.  
Ideal Flow: [Click the Facebook icon]
12. Access to Help and Contacts through the Site Map.  
Ideal Flow: [Click Site Map button -> Click Help and Contacts button]
13. Fill out and submit Help form.  
Ideal Flow: [Click Help and Contacts -> Click icon / or Send Email -> Click Send button]
14. From the previous screen access the Frequently Asked Questions.  
Ideal Flow: [Click back button to Help and Contacts - > Click icon / or frequently Asked Questions]

After the test and questionnaires:

Do you have any questions or comments? Thank you very much for your participation in this test, your opinion is very valuable to us.

## References

National Institute of Standards and Technology, *NISTIR 7432 – Common Industry Specification for Usability – Requirements*, 2007

## Annex\_8 – UEQ – User Experience Questionnaire

Please make your evaluation now.

For the assessment of the product, please fill out the following questionnaire. The questionnaire consists of pairs of contrasting attributes that may apply to the product. The circles between the attributes represent gradations between the opposites. You can express your agreement with the attributes by ticking the circle that most closely reflects your impression.

Example:

|            |              |
|------------|--------------|
| attractive | unattractive |
|------------|--------------|

Please assess the product now by ticking one circle per line.

|                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |                    |    |
|--------------------|---|---|---|---|---|---|---|--------------------|----|
| annoying           |   |   |   |   |   |   |   | enjoyable          | 1  |
| not understandable |   |   |   |   |   |   |   | understandable     | 2  |
| creative           |   |   |   |   |   |   |   | dull               | 3  |
| easy to learn      |   |   |   |   |   |   |   | difficult to learn | 4  |
| valuable           |   |   |   |   |   |   |   | inferior           | 5  |
| boring             |   |   |   |   |   |   |   | exciting           | 6  |
| not interesting    |   |   |   |   |   |   |   | interesting        | 7  |
| unpredictable      |   |   |   |   |   |   |   | predictable        | 8  |
| fast               |   |   |   |   |   |   |   | slow               | 9  |
| inventive          |   |   |   |   |   |   |   | conventional       | 10 |

|                    |  |                            |    |
|--------------------|--|----------------------------|----|
| obstructive        |  | supportive                 | 11 |
| good               |  | bad                        | 12 |
| complicated        |  | easy                       | 13 |
| unlikable          |  | pleasing                   | 14 |
| usual              |  | leading edge               | 15 |
| unpleasant         |  | pleasant                   | 16 |
| secure             |  | not secure                 | 17 |
| motivating         |  | demotivating               | 18 |
| meets expectations |  | does not meet expectations | 19 |
| inefficient        |  | efficient                  | 20 |
| clear              |  | confusing                  | 21 |
| impractical        |  | practical                  | 22 |
| organized          |  | cluttered                  | 23 |
| attractive         |  | unattractive               | 24 |
| friendly           |  | unfriendly                 | 25 |
| conservative       |  | innovative                 | 26 |

## Annex\_9 – SUS – System Usability Scale Questionnaire

### SUS – System Usability Scale Questionnaire

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## SUS – System Usability Scale

The System Usability Scale (SUS) is a Likert scale type questionnaire that was developed in the UK in 1986 by John Brooke at Digital Equipment Corporation. It is one of the most used questionnaires to assess the perception of usability. In a comparative study about usability questionnaires, SUS “yielded among the most reliable results across sample sizes” [3, p. 7].

SUS has become an industry standard with references in over 600 publications [2].

SUS is also freely available, being the only condition to use it the acknowledgement of its source in any published report.

With small sample sizes, like with 6 participants, SUS (like other questionnaires) is not particularly accurate. 12 participants or more is the recommended sample size for correct results [3, p. 6].

## 2. SUS Questionnaire

Using the rating sheet below, please circle the number nearest the term that most closely matches your feelings about the product/web site.

1. I think that I would like to use this system frequently.

Strongly disagree   1       2       3       4       5       Strongly agree

2. I found the system unnecessarily complex.

Strongly disagree   1       2       3       4       5       Strongly agree

3. I thought the system was easy to use.

Strongly disagree   1       2       3       4       5       Strongly agree

4. I think that I would need the support of a technical person to be able to use this system.

Strongly disagree   1       2       3       4       5       Strongly agree

5. I found the various functions in the system were well integrated.

Strongly disagree   1       2       3       4       5       Strongly agree

6. I thought there was too much inconsistency in this system.
- Strongly disagree 1 2 3 4 5 Strongly agree
7. I would imagine that most people would learn to use this system very quickly.
- Strongly disagree 1 2 3 4 5 Strongly agree
8. I found the system very awkward to use.
- Strongly disagree 1 2 3 4 5 Strongly agree
9. I felt very confident using the system.
- Strongly disagree 1 2 3 4 5 Strongly agree
10. I needed to learn a lot of things before I could get going with this system.
- Strongly disagree 1 2 3 4 5 Strongly agree

### Portuguese translation

Usando a escala abaixo, por favor coloque um círculo no número mais próximo da palavra que mais se aproxima aos seus sentimentos acerca do produto/website.

1. Penso que gostaria de usar este sistema frequentemente.

|                     |   |   |            |   |   |          |
|---------------------|---|---|------------|---|---|----------|
| Discordo fortemente | 1 | 2 | 3          | 4 | 5 | Concordo |
|                     |   |   | fortemente |   |   |          |

2. Achei o sistema desnecessariamente complexo.

|                     |   |   |            |   |   |          |
|---------------------|---|---|------------|---|---|----------|
| Discordo fortemente | 1 | 2 | 3          | 4 | 5 | Concordo |
|                     |   |   | fortemente |   |   |          |

3. Achei o sistema fácil de usar.

|                     |   |   |            |   |   |          |
|---------------------|---|---|------------|---|---|----------|
| Discordo fortemente | 1 | 2 | 3          | 4 | 5 | Concordo |
|                     |   |   | fortemente |   |   |          |

4. Penso que precisaria do apoio técnico para conseguir usar o sistema.

|                     |   |   |            |   |   |          |
|---------------------|---|---|------------|---|---|----------|
| Discordo fortemente | 1 | 2 | 3          | 4 | 5 | Concordo |
|                     |   |   | fortemente |   |   |          |

5. Achei que as várias funções do sistema estavam bem integradas.

|                     |   |   |            |   |   |          |
|---------------------|---|---|------------|---|---|----------|
| Discordo fortemente | 1 | 2 | 3          | 4 | 5 | Concordo |
|                     |   |   | fortemente |   |   |          |

6. Achei que havia demasiadas inconsistências neste sistema.

|                     |   |            |   |   |   |          |
|---------------------|---|------------|---|---|---|----------|
| Discordo fortemente | 1 | 2          | 3 | 4 | 5 | Concordo |
|                     |   | fortemente |   |   |   |          |

7. Imagino que a maioria das pessoas consegue aprender a usar este sistema muito rapidamente.

|                     |   |            |   |   |   |          |
|---------------------|---|------------|---|---|---|----------|
| Discordo fortemente | 1 | 2          | 3 | 4 | 5 | Concordo |
|                     |   | fortemente |   |   |   |          |

8. Achei o sistema muito incómodo de usar.

|                     |   |            |   |   |   |          |
|---------------------|---|------------|---|---|---|----------|
| Discordo fortemente | 1 | 2          | 3 | 4 | 5 | Concordo |
|                     |   | fortemente |   |   |   |          |

9. Senti-me muito confiante ao usar o sistema.

|                     |   |            |   |   |   |          |
|---------------------|---|------------|---|---|---|----------|
| Discordo fortemente | 1 | 2          | 3 | 4 | 5 | Concordo |
|                     |   | fortemente |   |   |   |          |

10. Precisei de aprender muitas coisas antes de conseguir começar a usar o sistema.

|                     |   |            |   |   |   |          |
|---------------------|---|------------|---|---|---|----------|
| Discordo fortemente | 1 | 2          | 3 | 4 | 5 | Concordo |
|                     |   | fortemente |   |   |   |          |

### 3. Calculating the score

SUS scores range from 0 to 100. Each item's score contribution ranges from 0 to 4. For odd items (1, 3, 5, 7 and 9), the contribution is the scale position minus 1. For even items (2, 4, 6, 8 and 10), the contribution is 5 minus the scale position. The SUS score is obtained by multiplying the sum of the scores of all items by 2,5.

SUS was only intended to measure a single dimension. However, there's research [2] showing that it can also assess the system's learnability, provided by items 4 and 10, and usability, provided by the remaining items. As such, in this example we'll also score those sub-scales.

#### Example

1. I think that I would like to use this system frequently.

Strongly disagree 1      2      3      4      5      Strongly agree

2. I found the system unnecessarily complex.

Strongly disagree 1      2      3      4      5      Strongly agree

3. I thought the system was easy to use.

Strongly disagree 1      2      3      4      5      Strongly agree

4. I think that I would need the support of a technical person to be able to use this system.

Strongly disagree 1      2      3      4      5      Strongly agree

5. I found the various functions in the system were well integrated.
- Strongly disagree 1 2 3 4 5 Strongly agree
6. I thought there was too much inconsistency in this system.
- Strongly disagree 1 2 3 4 5 Strongly agree
7. I would imagine that most people would learn to use this system very quickly.
- Strongly disagree 1 2 3 4 5 Strongly agree
8. I found the system very awkward to use.
- Strongly disagree 1 2 3 4 5 Strongly agree
9. I felt very confident using the system.
- Strongly disagree 1 2 3 4 5 Strongly agree
10. I needed to learn a lot of things before I could get going with this system.
- Strongly disagree 1 2 3 4 5 Strongly agree

Score from example

1. 3 points (4-1 (scale position -1))
2. 3 points (5-2 (5-scale position))
3. 3 points (4-1 (scale position -1))
4. 4 points (5-1 (5-scale position))
5. 3 points (4-1 (scale position -1))
6. 3 points (5-2 (5-scale position))
7. 3 points (4-1 (scale position -1))
8. 4 points (5-1 (5-scale position))
9. 3 points (4-1 (scale position -1))
10. 3 points (5-2 (5-scale position))

Total score = 32

SUS Global Score =  $32 * 2,5 = 80$

Learnability Sub score =  $7 * 2,5 = 17,5$

Usability Sub score =  $25 * 2,5 = 62,5$

### Notes

We changed the wording of item 8, replacing the word “cumbersome” with “awkward”, as it can cause confusion to some non-native English speakers [4, p. 9].

You should change the wording (“system”/ “product”/ “website”), depending on which seems more appropriate for the test, but keep consistency and use the same term on all items for any given test or across a related series of tests [idem].

